OCT 17 1887
30813
CITY OF WASHINGTON

PRICE 15 CENTS

OCTOBER 15, 1887.

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. XXII. REGULAR EDITION NO. 616.

ARCHITECTVRE.

ENGINEERING

DECORATION

CONSTRVCTION

TICKNOR & COMPANY

BOSTON MASS.

CONTENTS.

Editorial Summary.
A Day in Ottawa.
Professor T. Hayter Lewis on the Laying out of Town Areas.
Paris Gossip.
Building Materials. — VII.
Societies.
Communications.
Notes and Clippings.
Trade Surveys.

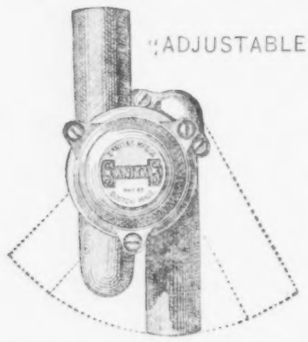
ILLUSTRATIONS.

A Corner outside the Ramparts, Quebec, Canada.
(Gelatine Print issued only with Imperial Edition.)
House of Francois I, Paris, France.
System of Laying-out of Town Lots.
Competitive Design for a Church, Kansas City, Mo.
Church, Birmingham, Ala.
Annex to Club-house, Tuxedo Park, N. Y.

THE SANITAS TRAP.

"RIGHT HAND."

"ADJUSTABLE."



"LEFT HAND."

SOME FACTS AND SOME FANCIES
ABOUT THE SANITAS TRAP.

I. It is sometimes asserted that the seal of the Sanitas Trap can never be broken under any conditions. This is erroneous. Its seal can be pumped out by a force-pump, or by *Laboratory plumbing apparatus*, especially devised to destroy the seals of traps by siphonage. But the seal of the unvented Sanitas Trap *never can be and never has been destroyed by siphonage in good plumbing work*. Furthermore, the unvented Sanitas Trap will stand a severer test of siphoning action than will the vented S-trap. This has been demonstrated over and over again, and the demonstration can be repeated at any time to the satisfaction of any who are interested, provided care be taken to vent the S-trap in a manner *which is practical in plumbing*, using a vent-pipe of the size, length, and average number of bends found in ordinary practice. The seal of the Sanitas Trap will be *lowered* by severe siphoning action, *but it cannot be broken*. II. Again it is sometimes asserted that the Sanitas Trap cannot be clogged. This is also erroneous. The trap can be clogged by matches or kitchen refuse, if improperly used, just as can any ordinary waste-pipe; but when properly set and used the Sanitas Trap will never become clogged to the point of losing its effectiveness. If improperly used, as when under kitchen sinks the cook takes out the sink-strainer and sweeps into the trap bones and refuse never intended for the waste-pipe, the Sanitas Trap will be fouled; but it then *has the great advantage over all others of providing the easiest and safest means of removing this refuse matter*, and that with the aid of an ordinary screw-driver. When used under sinks the trap should be placed close to the sink outlet, and the sink strainer should never be removed. The grease will then pass through the trap in a liquid state and be caught in the suitable grease receptacle beyond. The efficiency of the Sanitas Trap will then remain intact indefinitely, while other traps, like the old-fashoned "D" trap, or its modern representatives, the "Bottle," "Round," and "Pot" traps, have bodies so much larger than their inlet and outlet arms, that they obviously cannot be scoured by the water when it passes through them. III. It is often thought that where special trap vent-pipes are called for, the Sanitas Trap is not needed. Precisely the opposite is the fact. All sanitarians now admit that whether the trap vent-pipe be used or not, *the trap itself should be anti-siphonic*, since the vent alone cannot always be relied upon. The mouth of the vent-pipe is often clogged, under sinks, by grease, since it is never scoured, and the friction due to its bends, and to the disproportion between its capacity and its length, often destroys its efficiency as an air supply. The Sanitas Trap is so constructed that its seal cannot be injured by evaporation produced by trap venting. Therefore, *where trap-vent pipes are called for the use of the Sanitas Trap is particularly necessary*. In virtue of the peculiar construction of the Sanitas Trap, *its outlet-pipe forms its own vent-pipe*, which is infinitely better than a special vent-pipe, inasmuch as it is always kept open by the scouring action of its own discharges. But even if it should ever become closed by grease, no harm could come in this case, since the same closure would not only shut off sewer-gas and siphonage, but also at once announce itself and be removed. IV. Finally, the seal of this trap can never be destroyed by *back-pressure*, in properly arranged plumbing. For with the main soil-pipe vented as it should be, no back-pressure can be generated strong enough to do mischief, where ordinary care and intelligence are used in originally laying out the work. For further explanations on this matter see the circulars and other publications of the

BRASS TRAP.

CUP.

PARTITION

WASHER.

SANITAS MFG. CO., 207 TREMONT ST., BOSTON.

New York Branch Office, 92 Beekman Street, Oscar J. Saxe, Agent.

T. H. DUGGAN, 141 Dartmouth Street, BOSTON, MASS. TELEPHONE, 4165 } Will execute anywhere, in first-class manner, small or large contracts for **PLUMBING**

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XVII. Copyright, 1887, by TICKNOR & COMPANY, Boston, Mass. No. 616.

OCTOBER 15, 1887.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS.

SUMMARY

The Burning of the Theatre at Exeter, England. — The New York School-house Competition. — The Laying-out of Lots in New York. — Compensation for Rejected Designs. — The Rights of Abuttors on Public Streets. — Is an Architect's Certificate a Pre-requisite to a Contractor's Collecting his Pay. — The Excavations at Sybaris. — Ropes and their Uses. 177

A DAY IN OTTAWA. 179

PROFESSOR T. HAYTER LEWIS ON THE LAYING-OUT OF TOWN AREAS. 180

THE ILLUSTRATIONS: —

A Corner Outside the Ramparts, Quebec, Canada. — House of François I, Paris, France. — System for the Laying-out of Town-Lots. — Competitive Design for Grace Church, Kansas City, Mo. — Highland Episcopal Church, Birmingham, Ala. Annex to Club-house, Tuxedo Park, N. Y. 182

PARIS GOSSIP. 182

BUILDING MATERIALS. — VII. 183

SOCIETIES. 186

COMMUNICATIONS: —

Disputed Commissions. — Continuous Girders. — Architects should consult Specialists. — Tin *vs.* Galvanized-Iron for Roofs. 187

NOTES AND CLIPPINGS. 187

TRADE SURVEYS. 188

THE more detailed the accounts which we receive of the fire in the Exeter Theatre in England, the more deplorable appears the carelessness by which more than a hundred persons lost their lives. The building was a new one, the foundation having been laid only a little more than a year ago, and it was erected under the care and from the designs of an architect of great experience in planning such buildings. When the corner-stone was laid, the chairman of the company which owned the theatre made a speech, in which he said that "the real object" of the company was "to provide a theatre for Exeter of first-rate character, a place where they (the citizens) might go with a feeling of confidence and safety, and without being afraid of being roasted alive." We suppose that the chairman of the association of speculators thought it his duty to attract customers by alluring descriptions of the building, and left it to the architect to make his descriptions agree with the facts, and the architect, as usually happens in such cases, being brought face to face with incompatible requirements in regard to economy and safety, was probably obliged to conform to those which the chairman as a financier thought most important, rather than those which he had described to the admiring multitude in the halcyon time of laying the corner-stone. There was once a storage warehouse in New York, a tolerably flimsy affair, whose proprietor set up a sign in front of it bearing the words "Absolutely Fireproof." The building was soon crowded with goods, the owners of which, in many cases, thought it unnecessary to insure them, and, after bringing in fat profits to its managers for a time, it took fire and burned to the ground in a few hours, leaving its reassuring sign perched conspicuously over the ruins. In much the same way the Exeter Theatre, built "to provide a place where people need have no fear of being roasted alive," was provided with a weak proscenium wall, thinner, we believe, than the minimum allowed by law, and apparently built mainly to satisfy the inspector's hasty glance, and, in defiance of the rule accepted among architects for such cases, pierced with a door leading from the gallery to the stage side of the wall. The facilities thus provided for distributing fire from the stage over the auditorium were supplemented by an admirable arrangement for preventing the people in the upper part of the house from getting out in case of a conflagration. The gallery was seated for three hundred and fifty persons, and one door, five feet wide, was planned for all of them to get out of while the flames were rolling toward them! On the night of the fire the gallery was occupied by one hundred and ninety-one persons, of whom something like one-half managed to get out, although some of these were bruised and mangled to death in trying to run down the single tortuous staircase leading to the ground. It must be understood that we do not blame Mr. Phipps, the architect, for all these faults. He was, undoubtedly, compelled to yield his convictions to the requirements of economy and the routine of theatrical management, but we think it is quite time that theatrical management should be inquired into to see whether those of its principles which are incompatible with safety to audiences cannot be modified. It will be a hard matter, we imagine, to persuade lessees that the multiplicity of entrances, through which safety is most certainly secured, can be provided without greatly increasing their expenses for ticket-takers and guards, and the architects of theatres seem generally to have abandoned the attempt, confining their efforts to the provision of sprinklers, iron curtains, and other feeble safeguards on the stage. Now, however, the comparative uselessness of all these has been abundantly demonstrated, and the devices intended as improvements on these, such as scenery painted on wire gauze, asbestos curtains, and so on, are so costly that managers, who have already begun to grumble at the outlay necessary for modern stage fittings, are likely to rebel entirely if any more is laid upon them, so that a recurrence to the many-exit plan will probably be the next step. Properly managed, this is by far the cheapest and best solution of the problem, adding nothing to the cost of the theatre, and insuring the safety of the audience under all circumstances, even though the scenery, the curtains, and the decorations of the auditorium should be of cotton cloth. If the difficulty about controlling so many doors could be overcome, this would be the essence, as we think, of future theatre-construction, and the control of the doors is a problem of planning which architects are quite capable of studying and solving if they could once have the matter, from the manager's point of view, clearly explained to them.

MR. A. W. FULLER, the expert adviser in the New York school-house competition, which we discussed last week, writes us that, fortified by our remarks, he has been able to induce the State Superintendent of Public Instruction to open this competition to architects in any part of the country, and that, consequently, the date of closing the competition has been postponed to December 15 next. We regret that we did not know that the official head of the department was so ready to accept reasonable suggestions, as in that case we might have laid more stress on the desirability of making the prizes offered more commensurate with the work they are intended to reward.

THOSE who remember a few articles on "Urban Housing," published in the *American Architect* in 1878 and 1879, and can recall how well reasoned and practicable was the arrangement of houses upon the city lot prescribed in New York therein described, will be interested to know that the writer, Mr. Edward T. Potter, has continued his studies in a serious vein ever since, and has devised other arrangements than those previously described, which we are persuaded could be adopted in New York and elsewhere, with advantage to the general sanitary welfare of the citizens. Amongst our illustrations this week will be found a diagram which explains with clearness how Mr. Potter would arrange streets and houses so as to secure for them the greatest amount of the all-necessary sunshine and circulation of air: it is ingenious enough to deserve careful study at the hands of both architects and real estate owners.

TWO more illustrations of the way in which the French law looks at certain common questions are given in *La Semaine des Constructeurs*. The first case resembles one described by a correspondent in these columns not long ago. A certain proprietor requested an architect to make him plans and elevations, with a specification, for a house in the country. He told the architect what rooms he wanted, and how he wished them arranged, and when the plans were done he appeared to be pleased with them. When the estimates came in, however, they were found to exceed by a few hundred dollars the sum which he wished to expend. The architect left the papers and drawings in the proprietor's possession, but heard nothing further from him until he received a polite note, conveying thanks for his trouble in making the drawings, and informing him that another architect had appeared upon the scene, who had succeeded in getting what was wanted for a smaller sum, and that the building had just been finished from the latter's plans. The victim of the transaction, finding that nothing was said about paying him, then inquired whether he could collect proper compensation by process of law, and how much the compensation would be. To this inquiry the law-editor of *La Semaine* replies, saying that an architect who, at the request of another person, prepares plans and specifications, is

unquestionably entitled to be paid for doing so, whether his plans are executed or not. What should be the proper compensation to the architect in such a case would be a question, as we should say, for the jury. If the architect had been engaged for full professional service, there can be no doubt that he would be entitled to recover the full value of his contract, that is, the net profit above expenses which he would have received if he had carried the work through to completion; but where one had been simply engaged to make plans and specifications sufficient for estimate, it is not so easy to determine how much his trouble would be worth. A decree of the Court of Paris in 1844 fixed the proper compensation in such cases at one-sixtieth of the estimated cost of the building, or about one and-seven-tenths per cent. This seems to have been intended as a liberal interpretation of the value of the architect's services, as the correspondent of *La Semaine* only mentions one and one-half per cent as his idea of the proper amount of his bill, but the case may have seemed to demand such liberality.

THE second case, as treated by *La Semaine*, introduces a principle of law governing the rights of abuttors on public streets which is of considerable importance. Another correspondent is interested in a house which projects beyond those on either side of it so much that the sidewalk is nearly intercepted by it. The street is narrow, and the authorities propose to enlarge the roadway at the expense of the sidewalk, making the latter so narrow that none of it will be left in front of the house in question. The occupants of the house naturally do not like to step from their front door into the roadway, and they wish to know whether the city has a right to cut off their sidewalk. The answer of *La Semaine* contains very little comfort for them. The ground devoted to streets, it says, is inalienable and imprescriptible. No person can acquire any rights over it, and any encroachment or projection which may be tolerated, or even authorized, exists only on the condition that it may be suppressed at any moment by the same authority which once permitted it. This doctrine might be made a source of decided inconvenience to the dwellers in cities in this country, who enjoy all sorts of privileges in the shape of areas, hatchways, bays, porches and oriels projecting over the street line which are unknown in the formal French towns, but it may be that our common law would look at the matter differently.

WE have another curious French case, which we find described in the August *Bulletin* of the Société Centrale des Architectes. Here the question was whether the certificate of an architect is so usual a preliminary to payment to a builder under a contract that it is to be legally considered as implied in the contract if nothing is said about it. A certain Madame de Prandières had her château remodelled under the direction of an architect. A mason's bill was brought in for thirty-seven hundred dollars. The architect refused to certify it, and demanded that it should be reduced to twenty-six hundred, which he regarded as the proper sum; and the masons pursued him with protestations and claims for the full amount of the bill. Meanwhile, Mme. de Prandières came from Lyons to see the work, and the masons presented their bill to her; and she, being inexperienced in business, and supposing that the account was correct, paid it in full. On discovering the mistake, she demanded its correction, which the masons resisted, on the ground that an account once settled by agreement of both parties could not be reopened. The court, however, held that the account was not settled, since it had not received the approval of the architect, and it could not be supposed that Mme. de Prandières would have intentionally paid so large a bill if she had known that the architect had refused to certify it. Moreover, under the custom that a contractor's account must be approved by the architect before payment, the portion not approved by the architect was not, under the contract, due, and any person paying money not due was entitled to receive it back, whatever might be the formality with which it was paid, so that the lady had the right, if she wished, to demand the restitution of the whole sum paid beyond the amount certified by the architect. In point of fact, she asked only for the appointment of referees, to determine the exact amount due, and return her the balance, and the court ordered that this should be done forthwith.

THE *Builder* says that the Italian Government has appropriated the necessary funds for excavating the ruins of Sybaris, perhaps the most interesting locality in all Italy. When we reflect what treasures of art have been derived from Pompeii, a poor little village inhabited by people of Greek descent, it may be imagined how vast must be the stores of similar objects which were anciently accumulated in Sybaris, the richest of all the Greek colonies in Southern Italy, and at one time the central point of a community of busy farmers and artificers numbering three or four millions. Every one has heard of the luxury and extravagance of the Sybarites; how they slept on couches of rose petals, and forbade any noisy trade to be practised in their city, lest their nerves should be disturbed; and during the twenty-five hundred years that have elapsed since the conquest and destruction of the town, its treasures, instead of being gradually scattered, have rested securely under the alluvium of the River Crathis, the course of which was turned by the victors, expressly that its mud might cover the dwelling-place of their enemies. It is true that the assailants, the citizens of the neighboring city of Crotona, undoubtedly carried off all the most valuable objects that they could find, but some of the most precious ones were probably hidden out of their sight, and myriads of bulky articles, which were valueless to them, but to us are precious objects of art, and documents of archæology, must remain. The site of the town is well known and convenient, being close to the railway station of Buffalonia, near the Gulf of Tarentum, but the climate is so malarious that no attempt has been made, in modern times, to excavate it.

THE *Bautechnische Zeitung* gives some practical suggestions in regard to the use of ropes which may be worth remembering. With hemp ropes the character and probable strength may be judged in some degree from the appearance. A good hemp rope is hard, but pliant, yellowish or greenish gray in color, with a certain silvery or pearly lustre. A dark or blackish color indicates that the hemp has suffered from fermentation in the process of curing, and brown spots show that the rope was spun while the fibres were damp, and is consequently weak and soft in those places. Sometimes a rope is made with inferior hemp on the inside, covered with yarns of good material, but this fraud can be detected by dissecting a portion of the rope, or, in practised hands, by its behavior in use. Other inferior ropes are made with short fibres, or with strands of unequal strength, or unevenly spun. In the first case the rope appears woolly, from the number of ends of fibres projecting, and in the latter, the irregularity of manufacture can be seen by inspection. Occasionally, a hemp rope is spun with a core or central strand, such as is used in the interior of many wire ropes. This somewhat increases the strength, but the core, shut in by the outside strands, is liable to rot and infect the rest, and any rope with a musty, mouldy smell should be rejected. The best hemp comes from Russia, Switzerland, Alsace and Northern Italy, and it is said that the strongest fibres are obtained from plants grown at the foot of high mountains. Ropes to be used on board ship, or where they are liable to be often wet, are usually soaked in tar to preserve them, but the tarring diminishes the strength by about one-third, and increases the friction of the rope. The injurious action of tar upon the hemp fibres seems not to be clearly explained, but it is said to be lessened by subjecting the tar, before applying it to the rope, to repeated melting and washing with water. The effect on a rope of soaking with water is, however, worse than that of saturating with tar. According to accurate experiments, the tensile strength of a wet rope is only about one-third that of the same rope in a dry condition, and a rope treated with grease or soap is weaker still, apparently through the influence of the lubricant in facilitating the slipping of the fibres. It should never be forgotten that hemp cords contract strongly on being wet, a dry rope twenty-five feet long shortening to twenty-four feet or less when dipped in water or exposed to heavy rain. Every one remembers the story of the raising of the obelisk in Rome, when proclamation had been made that any one who spoke during the critical operation should suffer death, and how, when the obelisk had been raised nearly to its place, and the hoisting-cables had begun to stretch and threatened to let the stone fall, a bystander shouted, "Wet the ropes," and his advice was taken, and the obelisk drawn safely into place by the contraction of the fibres while the author of the suggestion was being dragged away to execution; and apocryphal as the tale probably is, it may have had a certain foundation in some opportune use of a property of hemp cordage which often causes loss and annoyance to builders who leave tightly-stretched ropes exposed to rain or dew.

A DAY IN OTTAWA.

SEEN by such light as a midnight sky in northern latitudes affords, Ottawa seemed to promise more entertainment than Montreal. The half-seen outlines of buildings on either hand suggested that daylight would show that the commonplace of every day had been left behind, and that at last something typical of the country and the people would be discovered in the morning. As the tired little hack-horse — successor to one the driver had done to death during the day in his endeavor to reap a profit out of the exhibition then holding just outside the town — turned a corner under what seemed to be a beetling fortification, the occupants of the back seat agreed that this little side-trip looked uncommonly promising. The supposed fortification seen by daylight proved to be merely a cliff some forty feet high, but even then it was much more picturesque than the mere wall of masonry that would have been found if the first impression of its martial character had been well founded. At any rate, its dusky outline served to give tone to the entrance into town and allowed the travellers to seek their rest with pleasurable anticipations of what was before them, after first having made sure of where the hotel stairs were, and discovered that the window looked onto some kind of back premises, which did not offer any promise of practicable escape in that direction in case of fire. This precaution is evidently one that visitors to Ottawa will do well to observe, for a few days later two of the hotels in the city were burned; but as the hotel in question still stands, the sensation of having narrowly escaped disaster cannot be added to the experiences of the trip.

If the Dominion of Canada has a flag of its own, it must be that that caught the eye of the just-awakened visitor as he slowly came to his bearings and wondered whether the day were fair or foul: a red flag with the union jack in the usual corner and in the field of the flag a small square patch bearing a scutcheon of some kind, but although the city abounded in flags in honor of the exhibition, it was not possible to determine with accuracy what the character of the design was. Apropos of flags, amongst all the fluttering bunting, not a single tri-color was to be seen, except over the door of a little wooden mission chapel where three strips of faded calico stood for the emblem which, one would think, must still be dear to those of French descent.

The first look about the town showed it to be a rather straggling place laid out on no very evident plan, except so far as it was apparently the intention to get as much benefit and enjoyment as possible from the beautiful situation selected for it on the banks of the Ottawa. It has not a little the air of a frontier town — and with good reason, for such it is, the great uncultivated wilderness lying not far to the north of it — just passing through its first period of municipal growth: the precise degree of development it has reached may be typified, perhaps, by the fact that, while it has horse-cars, the streets are unpaved. The few commercial buildings were uninteresting and characterless enough, and seemed to be such only as were needed to supply the daily needs of the inhabitants. There was little to be seen that suggested the presence of manufactures of any kind or anything like an export trade, except in lumber. This is the main interest of the place, and the huge piles of sawed lumber spread over acres and acres of ground about the Chaudière Falls make it seem impossible that a use can be found for so much wood, or that the forests can stand the drain upon them. How great an industry this is, is indicated by the report that our consul at Ottawa has just made in response to the instructions from Washington — which may have bearing on the matter of commercial union between Canada and the United States, or, just as well, upon the desirability of instituting at some time retaliatory measures to offset what are colloquially styled the fisheries outrages. From this report it appears that Ottawa exported into the United States $3,000,000 worth of dressed lumber during the last fiscal year; and the magnitude of the industry may be guessed from this fact, and the further fact that, so far as could be seen, the abstraction of so large an amount of wood did not appear to have any overwhelming effect on the stock in the lumber-yards. It was impossible to look on these vast stacks of lumber, through which ran covered passageways seemingly half a mile long, without thinking what a jovial bon-fire they would make; and it is more than likely that the possibility of such a fire may have been grimly present of late to the minds of the mill-men, surrounded as Ottawa has been for the passed few days by forest fires utterly beyond control, fires which have packed the river valleys with smoke so thick as to put a stop to river navigation, and have sent the dusky haze as far even as Boston, with such density as to make it impossible for photographers to do their work while it lasted.

Right athwart the town passes the Rideau Canal, and between the main street and the Ottawa River is a group of eight or ten locks whose filling and emptying are a constant source of interest to the idlers on the bridge which passes over the first one of the group. Lying just below this bridge, moored to the canal wall, was an aquatic caravan which had a most tantalizing air to any one who had any interest in out-door life and amusements — a little eighteen-foot steam launch, presumably moved by a naphtha-engine, and a companion boat in tow, with a deck-house filling its entire area, which was evidently provided with berths for two or three voyagers, and a galley. On the roof were lashed a canoe and the necessary paddles and spritsail rigging, with landing-nets, gaff-hooks and the other paraphernalia of the well-equipped sportsman. The whole outfit suggested that in the case of the boat's owner much of the hardship as well as some of the romance of camping-out had been minimized.

The canal just below the locks empties into the river, and upon either side of it rise picturesque and well-wooded cliffs, along the crown of one of which is laid out a pretty little public park which, in the general view, makes a good foreground to the cathedral beyond; while upon the plateau upon the opposite side of the gorge are laid out the grounds of the Houses of Parliament of the Dominion of Canada, the chief feature of interest in the city, and the particular pride of the entire country.

It would be hard indeed to find a better site for a group of public buildings. The river is broad enough, when full, for the marine [if the word is allowable] element in the landscape to have considerable effect, and the abrupt and rocky banks, though well wooded, fall away so as to give a broad pyramidal base to the group. No fault can be found with the grouping of the buildings; they compose well, as regards one another, from every point of view, and the observer is not consciously irritated by their presence in the midst of the fair surroundings. The landscaping is singularly successful — broad, generous, and judicious. In the photographs and published views this is lost sight of because no lens can compete in width of angle with the human eye, and from any point of view it is not possible to get a photograph of the group that will do the arrangement justice. If the individual buildings were as good architecturally as the landscaping of the group it would form a well-attended shrine for American as well as Canadian tourists. Unfortunately they are not, and just at present they are at a disadvantage, as they are not in the architectural fashion of the day. Victorian-Gothic seems a long way behind us nowadays, and the unfinished Patent Office on the opposite side of the street, with its full-centered arches and general air of robustness is much more restful and satisfying than its older and more audacious neighbor with its over-elaboration of Gothic detail. Moreover, it is built of a more agreeable material, a sandstone of a strong greenish tinge which in mass has considerable warmth to it. In the Houses of Parliament, on the other hand, a not too-successful attempt at polychromatic treatment has been made. The principal material used is a sandstone — a much more interesting material than that found about Montreal — in which are considerable traces of iron which, when the work was fresh, may have given an agreeable tone to the whole, but now are in too strong contrast with the mass of the material, the surface of which has weathered to a dirty chalky-looking substance. Moreover, in some of the older buildings of the group, here and there, are pieces of stone cut from strata impregnated with oil and this has oozed out and stained a sooty black the stones in its vicinity. The generally unsatisfactory coloring of the buildings is heightened by the color of the sandstone used for the voussoirs and some of the other wrought-stone finish: this is of quite a salmon-colored tone, and like everything about the stonework looks faded. The polychromatic endeavor reaches its greatest exaltation in the finials and crestings which are painted a brilliant ultramarine which, in places, as in the Victoria Tower, has washed off and stained the stonework of the roof below, so that this has quite the air of having been taken unrinsed from Monday's wash-tub. Feeling the need of keeping this vagary in countenance, some one has given the few outside blinds, which the convenience of the occupants has made it necessary to apply to windows here and there, vigorous coats of the same unusual color.

While the grouping is excellent and much of the detail good the unit of design is unqualifiedly bad, and in reaching this conclusion the observer is hardly influenced by the fact that Gothic work is just at present so out of fashion, for even when the revival was all the rage, the lancet window, which singly or in groups forms the key-note of the design, could never have been considered a well-proportioned feature. As compared with the height, the width is not too great, but the arch springs from a point apparently less than half-way up, the result being that the effect of verticality is lost, and the feature appears to be all arch — and arch of a very ungraceful form.

In one other particular the designer has missed his way: the Victoria Tower, which forms the chief feature of the Parliament Building proper, is in every way too small for its intended purpose, and from every point of view, except from a position on the main axis of the building, seems to be contending — and altogether unsuccessfully — with the library in the rear for the dominance of the group. Either the inspiration of the designer had spent itself, or the appropriation was too small when this feature was reached, for in some way a story or two seems to have been left out either at top or bottom, and the crown at the top seems meagre, perhaps intentionally symbolizing the waning respect for crowns that Canadians are nowadays suspected of entertaining. Seen from the rear the four ventilating towers, extremely good features in themselves, have each about as much importance as the Victoria Tower.

From most points of view the library is the dominating feature, and a very little variation in proportions and treatment would have made it so, and to the great advantage of the group. Even taken by itself this building would have gained by having a higher base or a more lofty main story. It is, nevertheless, a better and more interesting building in execution than photographs and prints would lead one to expect: it is quite large enough to lose some of that confectionery air that is so apparent in the published views.

As for the interior there seems to be, as is usual with such buildings, the maximum of husk to the minimum of kernel. The two legislative chambers are neither large nor imposing, but they are well lighted and airy apartments. The feature of the interior is the library which is rather interesting, though it looks hardly as if it were really meant for use, and as there seemed to be very little shelf-room unoccupied, it is not easy to see how the accumulations of future years are to be accommodated, for the plan of the building is peculiarly ill-adapted to expansion and alteration. The shelves are ranged along the walls of the sixteen-sided chamber, around which run the galleries. Alcoves are formed by short book-stacks projecting from the walls toward the centre of the room, and as these radiate shelves are of not too great depth the arrangement is a very decorative one, and distinctly helps the general effect of the whole room. As the library is extremely well lighted there seems to be no real reason for making the floors of galleries and alcoves of flooring glass, but the presence of this material is only an evidence of the thought and care bestowed on the work by the architect. The woodwork is white pine, finished in the natural color, and before the color darkened the effect must have been airy and pleasing, and the coarseness and obtrusiveness of the wood carvings must have been at that time much less noticeable than now. These carvings are the only really objectionable feature in the room; they shout for attention as soon as the door is open; *rinceaux* sprawl and wriggle at you, and cabbage-like flowers put on their broadest smile and try to lure you from point to point. Everywhere in the hand-carving is coarseness, excess and exaggeration. Nevertheless, the impression the room leaves on the mind, like that produced by the entire group of buildings, is very pleasant.

On the other side of the Rideau Canal just beyond the little public park rise the two open-work (hardly tracery) spires of the Cathedral of Nôtre Dame which make a very interesting point in the landscape by reason of the soft gleaming of the unpainted tin which protects them. The dry air of Canada makes it unnecessary to paint tin roofs, and the slow tarnishing of the bright surface eventually produces an effect which is far superior to anything which gilding can produce.

Aside from the Chaudière Falls just on the outskirts of the city, and forming part of the landscape seen from the Parliament grounds, there is little else to induce the visitor to wander far from this part of the city.

PROFESSOR T. HAYTER LEWIS ON THE LAYING OUT OF TOWN AREAS.[1]

Cap from Oakham Castle Hal

IN availing myself of the privilege of addressing the members of this Congress in this active and stirring town, which is spreading itself out in every direction, I have thought it well to bring before them a subject of great interest, but which has not been hitherto much discussed, viz., the extension of our great cities and the erection of new ones; and to suggest such a course as would ensure that such requirements as are now considered to be necessary for their healthful occupation may be provided for at the outset.

Of the conditions to be noted in selecting a site for a new city, we have descriptions by writers of all ages, from Vitruvius in the first century to Dr. Parkes in his well-known work of our own time. But this is a subject too large for a short address, and it is of the extensions only that I wish now to speak. They have, almost invariably, been carried out by speculators without any general definite guiding plan, with little or no forethought for future extension, and with slight provision for supplying the inevitable future wants of the inhabitants. Thus, in the course of time, spaces have to be cleared out for churches, schools, institutes, baths, and such like edifices as are now required for a large population, and clearances have to be made to allow for its free breathing. The extension of the cities takes place in different directions and from different motives.

The well-to-do citizens leave their smoky town and confined houses to form new suburbs, where they may breathe freely in their open gardens.

The artisans cluster together at first for cheapness and for nearness to their work. Then comes over-crowding and then Sanitary Acts, and then suddenly the neighboring fields are invaded, and acres of ground are covered with new small houses, put up as a speculation in the cheapest way, with just so much breathing-space as the local by-laws (if there be any) will allow.

Now, if this be the time of activity in building new towns and extending old ones, it is also preëminently the time of activity and power in corporate bodies. From Town Councils to Vestries, from Trade Guilds to Trade Unions, from companies formed for their own benefit and companies formed (all honor be to them) for the benefit of their fellow-citizens — an active part is being taken in public work.

New and extensive powers are being acquired and exercised by corporations for the sewage, the supply of water and of gas, for providing open spaces, regulating the width of streets, and even the height of rooms and size of windows. Your own by-laws are sufficient evidence of this.

Now I simply wish to extend these powers. I wish that when it may appear evident to a Corporation that any district will require before long a large accession of houses for a population which is clearly increasing to an overflow, such corporation shall have the powers (and I think that public opinion will require it to exercise them) to acquire control over the requisite land — to formulate a general plan, giving the width and direction of the streets — to provide spaces for such public buildings as are certain to be required in a well-regulated community, and for such open spaces as are required for its healthy enjoyment.

My scheme is not a very grand one in any respect; I simply want to provide at first for those requirements which must eventually be provided, which can only be fulfilled at a great cost, and even then imperfectly, if not so provided at first. I do not even suggest that the Corporation should build, but that it should give general guiding directions, leaving the working-out to private persons, or to such companies as have of late done so much good in building dwellings of various classes, from the highest to the lowest.

To show that such powers as I have indicated might well be called into being on behalf of even a high-class district, I might have brought before you the earnest attempt made, some thirty-five years ago,[2] by the late Professor Cockerell, R.A., to obtain a public control over the proposed buildings at Hampstead, a suburb now covered with houses.

As I was reminded by my friend, Mr. Rogers Field, the Professor drew out a design by which the whole of that suburb might have been built over on one definite plan, utilizing the various hills and valleys, so as to take every advantage of its picturesque beauties. Public opinion was not ripe for such a course then, and this grand opportunity was lost.

[Professor Lewis then described, with the aid of a map, a district of London, and the mistakes made in laying it out, and proceeded to point out in detail on another map the manner in which the same district might have been laid out, by forethought, so as to accommodate the same number of persons with more convenience for traffic and with greater attention to provision for healthful and enjoyable life. The details of Professor Lewis's remarks, however, can hardly be intelligibly followed apart from the diagrams, and we proceed to the more general remarks arising out of the subject.]

I now ask you to bear with me whilst I enter, in some detail, as to the public works and buildings for such provision should be made. I assume that, as a matter of course, the sewers, water and gas supplied, will be provided in the usual way, so I need not detain you as to these.

In the first place, I would set aside a strip of land outside the whole district for the park, which I take for granted would ultimately be required, no matter what the rank of the adjoining houses may be. Its distance from the farthest point would be about that suggested by Mr. Besant, viz., half to three-quarters of a mile. The size which I suggest here is about the same as that of the Hesketh Park at Southport, which is in one of the best parts of the town, and much smaller than the one here. The position of this open space would provide well, also, for the future extension of the town, and would afford the advantages obtained in the same way as, *e. g.*, at Hastings, where the pretty St. Andrew's Gardens, starting from the old town, pass round at the back of the houses, and are continued to St. Leonards, making an admirable belt of free open air and foliage. Neither in this case, nor in that of public buildings, do I propose the work to be undertaken at the first, but only so to arrange, at the first, that the sites shall be so reserved as to be available when required. As to these, I need do no more than mention offices for the local authorities, and the library, reading-room, science and art schools, and other buildings required for the particular locality.

In the arrangement of these public buildings it would be difficult to take a better example than that of Southport, whose Lord Street and Albert Road form one of the prettiest vistas that I know (I trust that Brikdale will pardon me for classing it with its neighbor) — and I use the word "prettiest" advisedly, as I could not, of course, compare it with such grand thoroughfares, each unrivalled in its way, as the High Street of Oxford, or Princes Street at Edinburgh.

[1] From the address given by Professor T. Hayter Lewis, F.R.I.B.A., as President of Section II, Engineering and Architecture, at the Bolton Congress of the Sanitary Institute.

[2] *Vide Builder*, vol. xi. (1853), p. 417.

At Southport the chief public buildings are located behind a group of trees, and I know of few more pleasing views than that of the spires and turrets of Christ Church, the Presbyterian Church, and the municipal and other buildings, towering above the foliage, whilst between the trees the buildings themselves are picturesquely seen.

Outside the park I should place the infirmary and convalescent home, a position in which they would have free light and air. If any one suggests that such a position would be too public, and lessen the enjoyment of the park, I would refer him to your own infirmary and children's hospital (the latter the gift, I believe, of your own townsmen, Dr. Chadwick, and his family), and ask him whether, as a simple matter of landscape effect, to say nothing of the value of such an outlook to the patients, he would wish this picturesque building, designed by one of your able townsmen, Mr. Knill Freeman, to be removed. Or, again, think of the charming way, and without the slightest feeling of sadness, in which the promenade at Southport ends with such a building, whilst at two such different places as Manchester and Hastings the Infirmary forms one of their most prominent buildings. Next to your noble Town-Hall and the old churches, the most prominent building is, I think, the market. I do not, of course, propose any such grand building as yours for my district. It might be open at the sides, but covered, as at Preston and Blackpool, or be enclosed as here and at Southport, or St. John's at Blackpool. I know that many towns of importance (I may, I think, name Norwich and Cambridge amongst them) have still little more than open and uncovered market-places, healthy-looking and pretty, with fruit and flowers and vegetables, on a fine day; but we often have quite other days in our country, and the attempts at covering up and protecting the stalls then turns the market-place into a wretched collection of tumble-down huts — I had almost said as bad as Fleetwood. If the quarter be chiefly for artisans, public wash-houses will be indispensable, and, in any case, no matter what the class of inhabitants may be, I look upon public baths also as a provision which can scarcely be valued too highly. For these baths and wash-houses I have suggested no definite site, as this would depend so very much on the kind of inhabitants.

Nor have I marked out definitely sites for churches, chapels or schools. All these are provided for in the district as it exists, and sites would undoubtedly be claimed for and provided, whatever the general plan might be.

I come now to some other details, as to which I may not possibly have your assent. First, as to drinking-fountains. That such small ones as are now commonly seen should be provided, you will doubtless quite approve. There are many excellent examples in most of the towns in these parts, each combining a drinking-fountain with a public lamp, and being really an ornament to the streets. But I want something more than these, as much for the sake of health as for ornaments to the town.

You know well enough that all the water in use for your houses is stored in cisterns; and although in past times these cisterns were looked upon as being worthy to be seen, and so were ornamented in a way which is now the envy and admiration of workmen and artists alike, they are now rough ugly things, stored away out of sight in any convenient closet or loft which will hold them, and for all their owners know of them may be considered as the property of the spiders. You depend upon your plumber to clean them out once a year. Perhaps he does; perhaps he does n't. You are none the wiser. But imagine what often happens in the houses of a poorer class. I need not go into details, but I say that a good supply of water, pure for drinking, is an element of health which ought to be provided, and that you cannot provide it in a better way than by fountains. These, in what are now called "the Dark Ages," formed some of the chief ornaments of a town, and I see no reason why they should not do so now.

I don't want to bring in such vast bodies of water as were brought through miles of aqueducts into Rome, or such lavish displays as you have seen in Paris, or even such things as our fountains in Trafalgar Square. Nearly all these send their waters into the drains.

There are fountains even now in most of our towns, — a very elegant one at Southport, for example; but, again, with all the water running to waste; whereas in some of the most picturesque Mediæval examples, it came out in small useful jets, as I would have them here; and I feel no doubt that, by a skilful arrangement of gas-jets, the effects of frost might be prevented, and a great boon thus conferred in winter, on rich and poor alike; whilst, by a skilful design, they could be some of the most pleasing ornaments to the town that could be conceived. And, as part of the water must go to waste, send it to feed a small stream in the park, like the one here or at Hastings.

Another accessory I must mention is that of seats placed at intervals between the trees. I shall, no doubt, have the same objection made to them as to the trees, and my answer would be the same.

Then, to complete my plan, I would have a small open space opposite to each railway station. Now we have to see, before entering into the question of the kind of houses to be provided, how much the plans which I have suggested have trespassed upon the space now occupied.

I have laid out my main roads in very much the same general direction as the present ones, though in less circuitous lines; but I have made them sixty feet wide instead of forty feet, and have set apart spaces for public buildings, etc. The smaller streets I have made forty feet wide, the width required by the Model By-laws being thirty six feet. The space which I have assigned to the park need not be taken into our calculation, as it is altogether outside that now built on; and I think you will readily see that the great waste of space necessitated by the irregular plan of the district, as now actually existing, would allow to a very great extent, if not altogether, for the extra space which the suggested re-arrangement would require.

As to the general arrangements of the streets and houses, I will call your attention to some methods, unusual to us, with which one meets abroad. I omit any notice of the large many-storied houses which are familiar to you on the Continent, and I shall take, as examples, one of the northern towns in Europe, Hamburg, and one of the southern ones, Naples. Several years since, I was commissioned to make a detailed report on the former town, for one of the principal insurance offices (the Union) of London, and I was thus led to see more of it than, perhaps, most of the people who visit it. The arrangement is peculiar. The main streets are wide, and give to a casual passer-by scarcely any indication of their affording access to any other streets. But a nearer inspection shows numerous doorways, so low and narrow that they appear to lead only into cellars, and through which you have often to descend by steps, and these lead into the streets behind, locally named *hofs*, which we should call alleys, and which are, of course, completely closed against ventilation from the main street. They vary from twenty feet to as little as five feet in width, the houses in the wider streets overhanging on each side and being densely populated. They usually abut on canals, and when these are dry the result in hot weather may be imagined. This arrangement, intended, no doubt, to bring different classes of people together, reminds one of the Wynds of Edinburgh, but with all their evils intensified, and a worse result could scarcely be imagined. Very many of these have been demolished, but a large number still remain.

I take you down now to the sunny south at Naples, where the same attempt has been made. It is not in my province now to describe the ordinary houses there — of the horrors of which Signor Gallenga and Mrs. Oliphant have given most vivid descriptions — but only the particular class to which I have alluded, and which may be seen to perfection in the drive through Portici. The streets throughout are wide, and lined for the greater part of their length with frames of macaroni hung out to dry, and many here will no doubt well remember both the sight and the smell. The houses on each side are several stories high, the first floors (*piani nobili*) having wide balconies, and altogether having a cheerful look and being tenanted by well-to-do and often wealthy people, whose apartments are entered from an internal court approached from the street by a lofty carriage gateway, through which one has lovely glimpses of beautiful gardens sloping down to the Bay of Naples. But the lower stories throughout, close on the ground, are tenanted by humbler classes, their rooms entered from the street. Here, again, we meet with an attempt to combine the classes, and thus to prevent one neighborhood being given up to the poor and another to the rich.

But again this fails. The lower rooms have no windows or other openings at the back, and derive the whole of their light and air from the street. The state of the inner rooms, usually parted off by a curtain as sleeping apartments, in the heat of an Italian summer may be imagined; and these rooms are not inadequately described by Mrs. Oliphant as "dark caverns with one vast door, giving all the light that can penetrate." Were it not that the people live almost entirely in the open air, they must be decimated. The same arrangement will be found in most other Italian towns, but in them there is, usually, some opening, however small, at the back.

Something of the same kind would appear to be adopted, judging from the plan only, in a flourishing town in our own country, — viz., Great Yarmouth, the arrangement of which is very peculiar, and unlike that of any other English town with which I am acquainted. I show a drawing of this, enlarged from one which was kindly drawn for me by Mr. Arthur Hewitt, an architect in the town, who has supplemented the Ordnance Map by many important details. The main streets are wide and well ventilated, and lined with good houses (mostly shops) several stories high; and running between these streets at intervals of about forty-five feet are long narrow alleys, termed rows, out of which lead houses of an inferior class. Looking at the plan only, this would seem to be no better than Hamburg; but in reality it is vastly better. The entrances are open for their whole height to a wide street at each end, or to the spacious quay; the alleys are cleanly kept and well paved, the houses in them are low, so as to intercept the light and air very slightly, and each has a small court attached to it; and the whole arrangement, so far as I can ascertain, is not prejudicial to health. Nevertheless, the narrowness of the streets does, no doubt, to some extent, clash with the golden rule which Dr. Richardson put very strongly in his well-known lecture at Croydon (1879): "Make the sun your fellow-workman," which is much the same as the Italian proverb, "Where the sun does not enter the doctor does."

Now, in remodelling our district, what system shall we adopt as to the houses? The first question is as to their number of stories. This subject is a serious one, for hundreds of acres near our towns are now being covered with two-storied dwellings, clustered close together in populous neighborhoods, or semi-detached when more in the suburbs. As to this, I do not wish to lengthen my paper by going into any argument, but I must briefly allude to some of the leading facts. The governing idea in respect of the self-contained houses of two stories is, of course, that of privacy, or, in the better

class of houses, the absence of stairs; but in many of our new London squares one large open space, garden, or yard (according to the class of house) is common to all; and the separate houses are being largely superseded by the dwellings in flats. At the first sight the two-storied houses would appear to have the recommendation of ensuring a less dense population than in the many-storied ones; but I wish to consider the subject on the basis of the same number of inhabitants in each case, the area gained by the extra stories being appropriated to open spaces in the way of yards or gardens, so that no question as to the bearing of the density of the population upon their health will rise here.

In considering the relative merits of the different styles of houses, the first fact which presents itself is, that with those of two stories only, the whole of their inhabitants must live and sleep either immediately over the ground or directly under the roofs.

I need scarcely say that the nearer to the earth the ground-floor is the cheaper it is to build, as less height of wall is required; and the consequence is that the floor is raised a few inches only above the street level, and the occupant has only that space between him and the earth. The rest of the inhabitants must live and sleep directly under the roof, — not a very pleasant experience even in well-built houses, whether through the heat of summer or cold of winter; and very many here, doubtless, know what is the case where the house is run up cheaply merely to sell. In point of economy of building, and of course of rent, it must be borne in mind that, though the thickness of the lower walls must be somewhat greater in a high house than a low one, one roof will cover, and one foundation hold up, four or more stories, as well as they will cover and hold up two.

As to the general feelings with respect to the subject, I recall and agree with the words of my predecessor, Professor Roger Smith, in his address at Glasgow in 1883,[1] that the system of flats is opposed to the general feeling; and I agree with him, also, when he says that they are not so unpopular now, and have many advantages.

Of course, the height of houses, whether in flats or separate, varies very much, buildings of five, six, or seven stories being common enough, — my own house has six; but I propose, in the comparative plans which I show, to limit our consideration to four stories, which is the limit suggested by Professor Robinson, in his address at Newcastle, 1882.[2] My plan shows, first, the actual space at present occupied by two blocks, each of fifty-eight two-storied houses, and their open areas of streets and yards; and, secondly, the space which would be occupied and the area gained, if the same number of inhabitants lodged in half the number of houses, but four stories in height. The contrast as to open space is rather striking, and with increased height the size of that space will of course increase.

One thing more. In his well-known address in 1879, Dr. Richardson spoke of his ideal cities as competing with each other in the beautiful as well as the useful, and I have spoken all the way through of doing what we have to do in the streets, the buildings, the fountains, in such a manner as to give a cheerful aspect to the scene, and afford some scope, however slight, to the feeling of beauty which is inherent in mankind, whether for color or form, for a flower or a building, and not to offend the eye by the mean and the ugly.

Years back, in the prime of his life, Mr. Ruskin pointed out[3] most forcibly "that it is chiefly by private and not by public effort that a city is adorned, and that it did not matter how many beautiful public buildings it may possess if they are not supported by and in harmony with the private houses (and, I may add, of the factories) of the town," and if it be held that all we have to do is to provide houses which shall be fairly comfortable, whether for rich or poor, and that rows of such houses will answer all the purpose if built with windows large enough and numerous enough, and that nothing else in them need be studied, then I say that our town lacks one great feature which might conduce to the pleasure of its inhabitants, and in neglecting that we have neglected one means, however slight, towards that healthful mental state which helps the bodily so well.

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

A CORNER OUTSIDE THE RAMPARTS, QUEBEC, CANADA.

[Gelatine print, issued only with the Imperial Edition.]

HOUSE OF FRANCOIS I, PARIS, FRANCE.

THIS charming bit of early Renaissance architecture was built by François I, in 1523, at Moret, on the edge of the forest of Fountainebleau, for the King's sister, Marguerite, or for one of his mistresses; tradition says it was inhabited by the famous Agnes Sorel. It was sold by the French Government in 1826, subsequently passing into the hands of its present proprietor, who caused it to be removed to Paris, and rebuilt, stone for stone, in its present position at the corner of the Rue Bayard and the Cours-la-Reine, a lovely boulevard extending along the right bank of the Seine near the Champs Elysées. The building is in such a perfect state of preservation that it seems no older than the modern houses immediately adjoining it. It is built on a terrace raised some six feet above the sidewalk and crowned by the balustrade shown in the foreground of the photograph. It is a perfect gem, almost, if not quite, the only pure piece of François I work to be found in Paris, and indeed one of the best examples of the style in existence. The material is the pale yellow sandstone, such as has been used for nearly all building operations in France. The medallions in the frieze over the large windows are portraits of Marguerite de Navarre, in the centre, Henry II, Diane de Poitiers and François I on the right, and Louis XII, Anne de Bretagne and François II on the left. All of the sculptures are attributed to Jean Goujon.

SYSTEM FOR THE LAYING-OUT OF TOWN LOTS DEVISED BY MR. EDWARD T. POTTER, ARCHITECT, NEW YORK, N. Y.

COMPETITIVE DESIGN FOR GRACE CHURCH, KANSAS CITY, MO. MESSRS. JAMES & JAMES, ARCHITECTS, KANSAS CITY, MO.

HIGHLAND EPISCOPAL CHURCH, BIRMINGHAM, ALA. MESSRS. CHISHOLM & GREEN, ARCHITECTS, BIRMINGHAM, ALA.

ANNEX TO CLUB-HOUSE, TUXEDO PARK, N. Y. MR. JAMES BROWN LORD, ARCHITECT, NEW YORK, N. Y.

PARIS GOSSIP.

WHEN our friends and former companions come to visit the Exhibition of 1889, those who arrive by the Ligne de l'Ouest will no longer recognize the St. Lazare Station. The old building, small, dirty and inconvenient, will have entirely disappeared, and the moving into the new building will probably not be entirely finished, but the bulk of the work will be done. This, at least, is what the architect in charge of the new building, M. Just Lisch, Inspector-General of Historical Monuments, has agreed to do. I have visited him, and he has with much good nature given me the information which I now transmit to you.

All the part of the Rue St. Lazare, situated between the Rue de Rome and Rue d'Amsterdam, is to entirely disappear, as well as the old entrance to the station, — that narrow and always crowded court-yard, shaped like a horseshoe. In its place a vast court-yard will give access to the grand entrance of the Salle des Pas Perdus, from which broad staircases will lead. This entrance will be used especially by the main lines and the traffic for England. A smaller court-yard will be found at the other end of the station on the side of the Rue de Rome, through which will pass all the traffic for the suburbs, so important on all these lines, the Ceinture, Versailles, St. Germain, Argenteuil, etc. These two great entrances will be separated by a structure which will look, unfortunately, on the Rue St. Lazare, masking the façade of the new station, from which it will be separated by a street eighteen metres wide. M. Lisch, and everybody else, deplores this arrangement, which absolutely hinders the possibility of giving to the approaches to the station the grand and monumental aspect which every artist ought to seek, and which squares and gardens would have enabled him to give them. But here arises a question of interest. The company owns the land reaching to the Rue St. Lazare, and the houses which are now being demolished. These vested rights are worth seven millions of francs. The income from them should be considerable, and the company cannot inflict on its stockholders the enormous sacrifice which would be imposed on them by not making use of the land. The company was disposed to do all it could, but only with the aid of the State and the city of Paris; but neither the State nor the city could or would aid the company. It has, therefore, been decided to erect upon a fairly large part of the territory between the station and the street buildings which will bring in an income. It is proposed, but nothing is yet decided upon or studied, to construct a large hotel, which the company would build at its own expense, and of which M. Lisch would be the architect. It would have about 3,500 metres of area, and would cost the sum of four or five millions of francs.

The new station extends, then, from the Rue de Rome to the Rue d'Amsterdam, with a façade of 210 metres. At the ends are the two entrance pavilions, each sixty metres wide. The Salle des Pas Perdus, to which they give access, is that of the old building, but extended on the Rue d'Amsterdam side. Under this hall are the baggage-rooms and the exits for the passengers to the suburbs. The arcades of the present Salle des Pas Perdus are preserved, but will not form part of the façade. This will be distinguished by a closed gallery with segmental arches, where the sale of tickets will take place, and to which the public will not have access. From the width

[1] Transactions of the Sanitary Institute, 1883.
[2] Transactions of the Sanitary Institute, 1882-1883, p. 185.
[3] Lectures at Edinburgh, 1854.

Copyright (1887) by Tichnor & Co.

House of Francis I, Paris.

Bicknell Printing Co. Boston.

COPYRIGHT 1887 BY TICKNOR & CO.

DIAGRAM,

Showing an Application to Land, bet. 30° & 60° N. Lat. Laid out in streets and lots as in New York, of E. T. Potters SYSTEM for Securing on any given area of Land, in Cities or Elsewhere, The Largest Number of DWELLINGS for FAMILIES Etc. having regard also to CONVENIENCE, Privacy, RENTS, Appearance, LIGHT, AIR, Thorough draught, Sunshine etc. (See NOTE below.)

LATITUDE	SUN RISES A.M.	SUN SETS P.M.	Inclination of Noon Lie. Shortest Shadow on Dec. 21st	
59.56	8.54	3.3	6.44	St Petersburg
55.51	8.28	3.29	10.45	Glasgow
52.31	8.11	3.46	14.7	Berlin
51.32	8.5	3.50	15.6	London
48.51	7.53	4.4	17.45	Paris
48.13	7.50	4.7	18.23	Vienna
45.31	7.39	4.18	21.6	Montreal
41.53	7.25	4.31	24.45	Chicago
41.6	7.21	4.36	25.52	New York
39.53	7.20	4.37	26.41	Pekin
39.47	7.14	4.43	28.46	San Francisco
30.	6.53	5.4	36.36	New Orleans

SCALE 0 5 10 20 30 40 50 feet

SECTION. (through Stair Landings)

SIDE STREET, 60 feet wide.

Dec. 21st

Nov. 21st Jan. 21st

Record of Study to date

Inclination 1 Cir. 1 in 2.7 at New York of Shortest Lie Noon Shadow on Dec. 21st

Corridor

Corridor on one floor only, from for use in connection, by bridge.

Stairs & Stairs with Life.

Sub-Basement | Basement | 1st Story | 2nd Story | 3rd Story | 4th Story | 5th Story | 7th Story | 9th Story

25 25 25 25 25 25 25 25 feet

J F F F F F J S C C S

J F F J C C

D

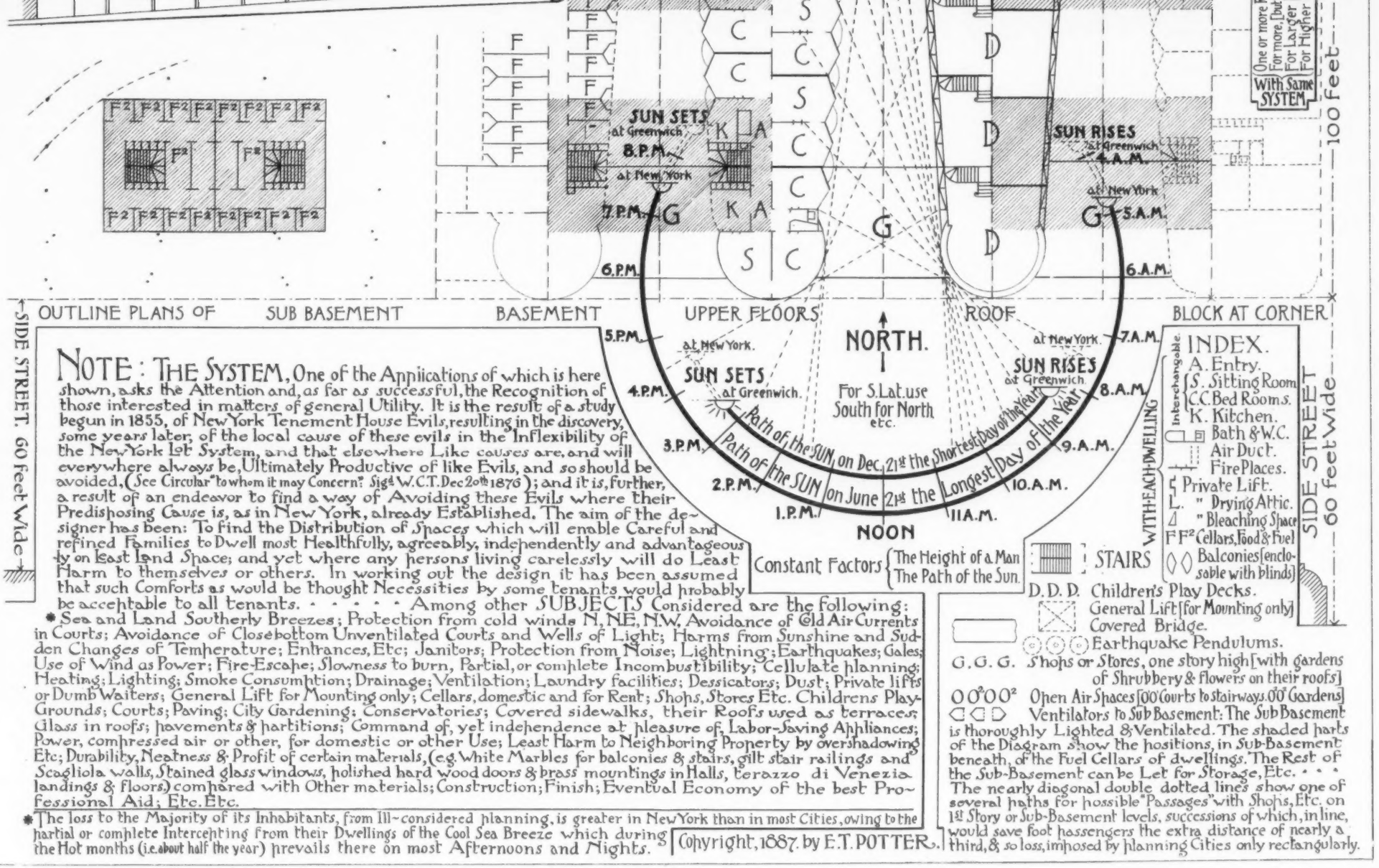
K A

O O²

100 feet

AVENUE

One or more Rooms can, if preferred, be taken from One Dwelling, and added to the Next. For more, [but smaller] Dwellings, on Same Land Space: Use more Staircases. For Larger [but fewer] ROOMS on Same Land Space: Use Fewer partitions. For Higher Rents: Use More Land, and Wider Spacings, Etc.



NOTE: THE SYSTEM, One of the Applications of which is here shown, asks the Attention and, as far as successful, the Recognition of those interested in matters of general Utility. It is the result of a study begun in 1855, of New York Tenement House Evils, resulting in the discovery, some years later, of the local cause of these evils in the Inflexibility of the New York Lot System, and that elsewhere Like causes are, and will everywhere always be, Ultimately Productive of like Evils, and so should be avoided, (See Circular "to whom it may Concern" Sig[d] W.C.T. Dec 20th 1876); and it is, further, a result of an endeavor to find a way of Avoiding these Evils where their Predisposing Cause is, as in New York, already Established. The aim of the designer has been: To find the Distribution of Spaces which will enable Careful and refined Families to Dwell most Healthfully, agreeably, independently and advantageously on Least Land Space; and yet where any persons living carelessly will do Least Harm to themselves or others. In working out the design it has been assumed that such Comforts as would be thought Necessities by some tenants would probably be acceptable to all tenants. . . . . Among other SUBJECTS Considered are the following:

* Sea and Land Southerly Breezes; Protection from cold winds N, NE, NW, Avoidance of Cold Air Currents in Courts; Avoidance of Closebottom Unventilated Courts and Wells of Light; Harms from Sunshine and Sudden Changes of Temperature; Entrances, Etc; Janitors; Protection from Noise; Lightning; Earthquakes; Gales; Use of Wind as Power; Fire-Escape; Slowness to burn, Partial, or complete Incombustibility; Cellulate planning; Heating; Lighting; Smoke Consumption; Drainage; Ventilation; Laundry facilities; Dessicators; Dust; Private lifts or Dumb Waiters; General Lift for Mounting only; Cellars, domestic and for Rent; Shops, Stores Etc. Childrens Play-Grounds; Courts; Paving; City Gardening; Conservatories; Covered sidewalks, their Roofs used as terraces; Glass in roofs; pavements & partitions; Command of, yet independence at pleasure of, Labor-Saving Appliances; Power, compressed air or other, for domestic or other Use; Least Harm to Neighboring Property by overshadowing Etc; Durability, Neatness & Profit of certain materials, (e.g. White Marbles for balconies & stairs, gilt stair railings and Scagliola walls, Stained glass windows, polished hard wood doors & brass mountings in Halls, terazzo di Venezia landings & floors) compared with Other materials; Construction; Finish; Eventual Economy of the best Professional Aid; Etc. Etc.

* The loss to the Majority of its Inhabitants, from Ill-considered planning, is greater in New York than in most Cities, owing to the partial or complete Intercepting from their Dwellings of the Cool Sea Breeze which during the Hot months (i.e. about half the year) prevails there on most Afternoons and Nights.

Constant Factors { The Height of a Man / The Path of the Sun.

STAIRS

D.D.D. Children's Play Decks.
General Lift [for Mounting only]
Covered Bridge.
Earthquake Pendulums.
G.G.G. Shops or Stores, one story high [with gardens of Shrubbery & flowers on their roofs]
0°0°0² Open Air Spaces [0°0 Courts to stairways. 0°0 Gardens]
Ventilators to Sub Basement: The Sub Basement is thoroughly Lighted & Ventilated. The shaded parts of the Diagram show the positions, in Sub-Basement beneath, of the Fuel Cellars of dwellings. The Rest of the Sub-Basement can be Let for Storage, Etc. . . . The nearly diagonal double dotted lines show one of several paths for possible "Passages" with Shops, Etc. on 1st Story or Sub-Basement levels, successions of which, in line, would save foot passengers the extra distance of nearly a third, & so loss, imposed by planning Cities only rectangularly.

INDEX.
A. Entry.
S. Sitting Room
C.C. Bed Rooms.
K. Kitchen.
Bath & W.C.
Air Duct.
Fire Places.
Private Lift.
L. " Drying Attic.
" Bleaching Space
F F² Cellars, Food & Fuel
Balconies [enclosable with blinds]
Interchangable.
WITH EACH DWELLING

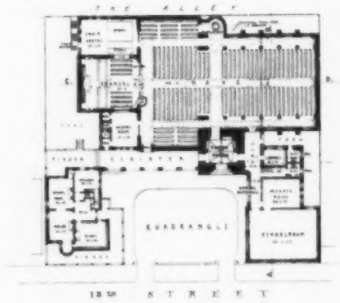
Copyright, 1887. by E.T. POTTER.

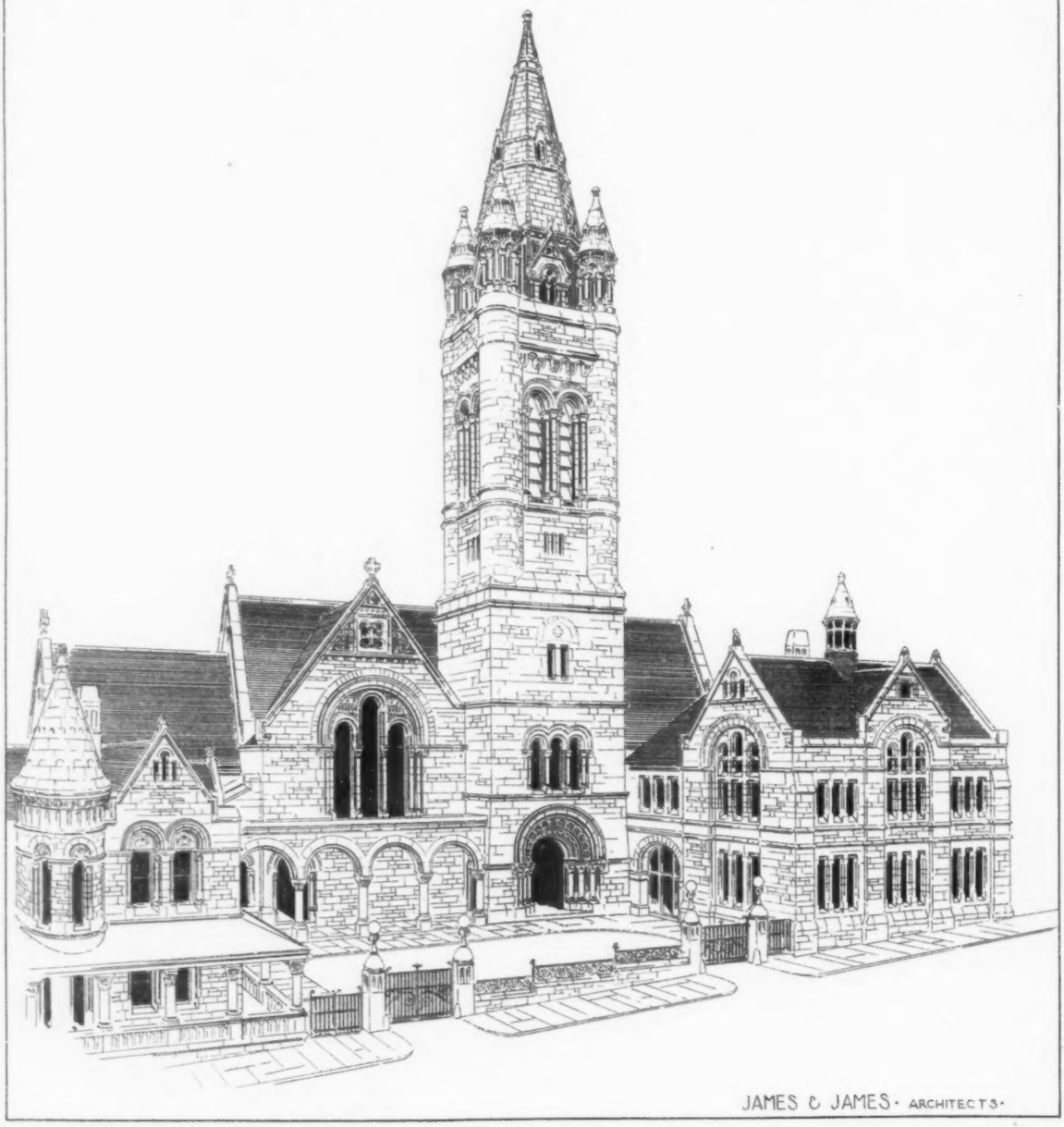
Heliotype Printing Co. Boston

COPYRIGHT 1887 BY TICKNOR & CO

GRACE CHURCH

KANSAS CITY · MO ·





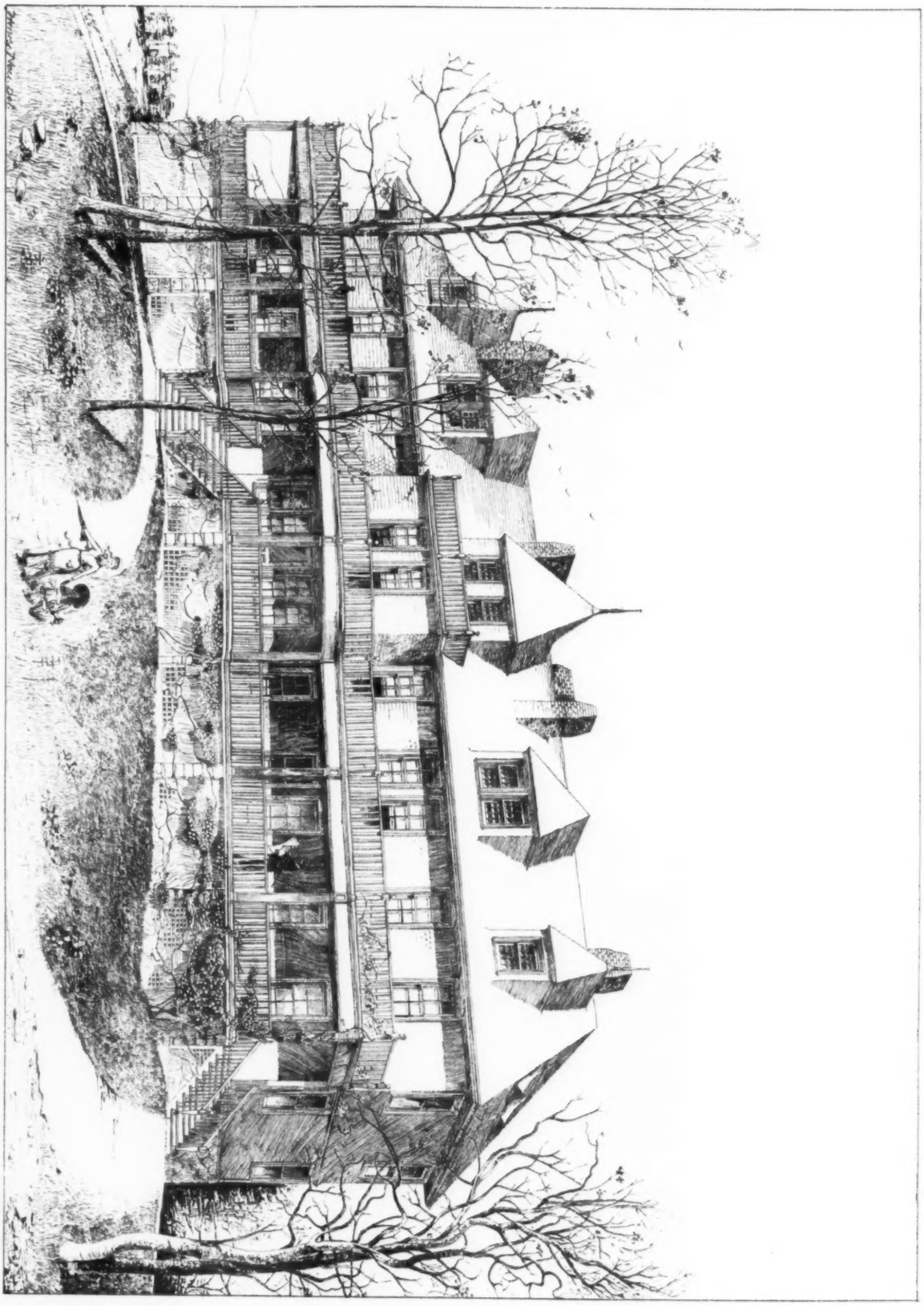
JAMES & JAMES · ARCHITECTS ·

Heliotype Printing Co. Boston.

+

"IN HOC SIGNO VINCES"

COPYRIGHT 1887 BY TICKNOR & Co



ANNEX TO CLUB HOUSE.

TUXEDO PARK N.Y.

J.B. BROWN LORD ARCHITECT.

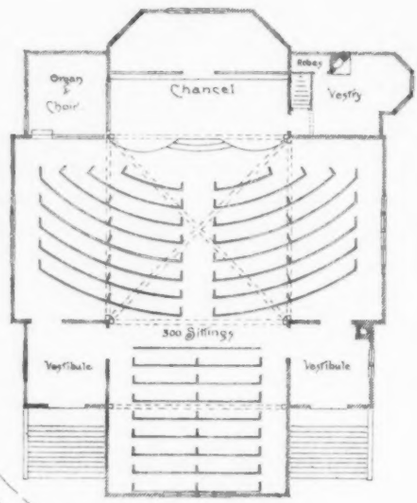
424 EAST 23RD ST. N.Y.

Heliotype Printing Co. Boston.

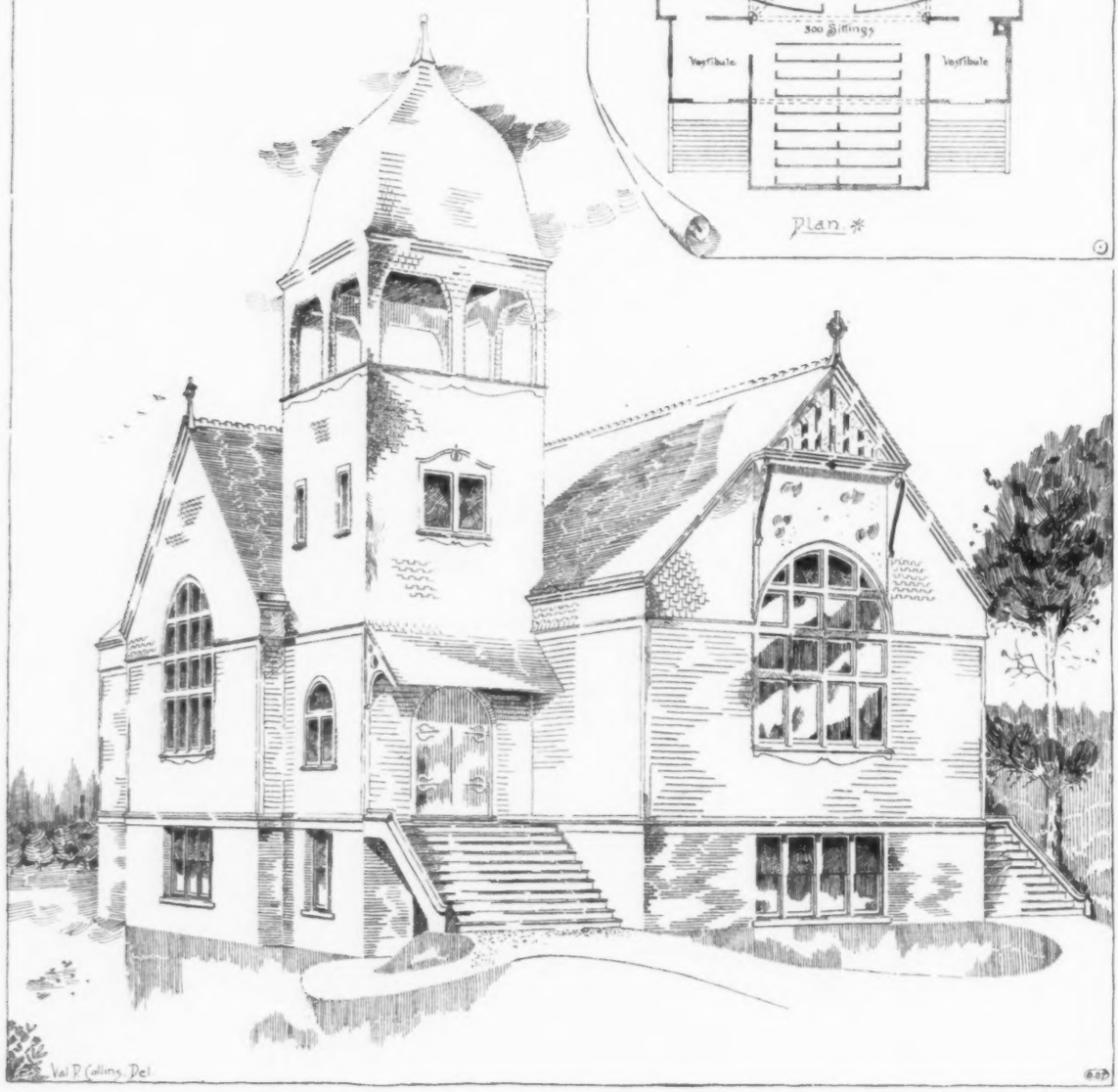
COPYRIGHT, 1887, BY TICKNOR & CO.

Highland Episcopal Church,
Birmingham, Ala.

Chisolm & Green, Archts.
Chisolm Block, 21st Street.



Plan.



Val P. Collins, Del.

Heliotype Printing Co. Boston.

of this gallery will be taken the necessary space for two staircases descending from the Salle des Pas Perdus to the baggage-rooms.

And now I am going to forestall the criticisms which can be levelled at these staircases which M. Lisch desired to have broad and of a single flight, but which the company was obstinate in wishing to divide and constrict. M. Lisch finally succeeded in gaining acceptance for the fine staircases in the two entrance pavilions, and the one on the side of the Rue de Rome has been open to the public for the last two months, and is admired by everybody. Why does the company, which is equally satisfied, although at first opposed to the arrangement, continue to make the same opposition to the other staircases? It is a mystery of which the victim will be the architect, if the company does not give him full liberty to do his best. Let us hope that M. Lisch will win the day. The pavilion on the side of Rue d'Amsterdam will be connected to the old façade of the station on that street, which is preserved only for economical reasons, for its aspect is not satisfactory. At the present moment they are actively carrying on the demolition of the houses on the Rue St. Lazare. The administration buildings, which face the Rue de Rome and form the great entrance pavilion upon this side, are finished, and occupied by the director-general, the administrative council — whose chamber is very fine — and the auditors' bureau. In the attics are the archives, and in the basement the vaults and safes, as well as the printing press for printing all the tickets of the line. These two entrance pavilions will form the most interesting part of the new façade. They are formed by a central portion accented by seven bays, with full-centred arches on the ground floor, and large mullion windows running through two stories above. These bays, with their stone pilasters and segmental arches, are separated by pilasters which support an attic story. The staircase leading to the Salle des Pas Perdus occupies on the ground floor the width of three bays, and is decorated by two fine granite columns. The vestibule which precedes it has the width of five bays. At the ends of the pavilion are two projecting parts, whose roofs rise higher than that of the central building. In each of them on the first story is a grand full-centered arch divided into three bays by two mullions. In the centre of the pavilion, in the attic story, is detached an architectural feature in which is placed the clock. This façade bears little sculpture, — only some bits in the attic story about the clock and the pilaster capitals. What there is is treated with too much delicacy — the foliage is too much detailed. A little more breadth in the execution would have given a more robust appearance.

Near the Pont de l'Europe, and separated from the station proper, rises the brick and stone train-house. This building has been in use since last winter. The new buildings on the side of the Rue d'Amsterdam are still to be built, and the demolition of the buildings upon the other side of this street, in order to give a greater open space for the service of the main lines, is still to be done. Work began in May, 1885. The total expense reaches twenty millions of francs, including the special building for the express department. This new building occupies on the right side of the street next to the Pont de l'Europe a site of 4,500 square metres. At the rear, level with the Rue St. Petersburg, opens the entrance to the grand hall, through which the baggage-wagons pass. This room is brought into connection with the railway, which is twenty feet beneath, by means of two elevators, which enable the wagons to descend and ascend. The floor of this hall is of compressed asphalt on enormous iron beams four metres deep and of thirty metres span, which are borne by twenty-four large piers of cut stone. These piers are about four metres high, and each cost 5,000 francs. The head-room beneath the piers is four metres eighty centimetres, and this height exists everywhere under the great hall. There are eight passageways for wagons of different classes. Each of the wagon elevators is moved by three hydraulic presses, which, with pistons seventeen-and-a-half centimetres in diameter, can lift a weight of ten tons each, which allows the three presses when brought into use together to lift thirty tons. For a weight of twenty tons only two are used, and one only for ten tons' weight. The hoist of these presses is 9.60 m. The upper portion of the elevator-shafts, which are situated in the middle of the main hall, is arranged so as to open in two parts as the wagon rises, and fall down upon each side of the platform bearing the wagon. These two covers close again on the descent of the platform, so that there is never an open space in the floor of the hall. The compression engines for the working of the elevators are situated at Batignolles, at a distance of twelve hundred metres. The duct which connects them with the baggage-building passes under the streets and under the tunnel of the Batignolles, through which all the trains of the Ligne de l'Ouest pass: it cost 300,000 francs. The total expense for the construction of the baggage-building will exceed three million and a half francs. It has been in use for some time past.

The first stroke of the pick was made in March, 1885, and consequently it has taken a little more than two years in building. Such is the present state of the works which throw into confusion an entire corner of Paris, and that will give to the new station when it is finished the aspect which the point of departure of so important a line should bear.

For a month past, at the Palace de l'Industrie in the Champs Elysées, has been holding the Ninth Exhibition of the Decorative Arts. The arrangement of the grand nave is very ingenious and decorative: two great Renaissance staircases ascend from the two ends of the garden to the first story; four porticos in the length of the garden are occupied by the exhibitors; in the centre is a platform for concerts. Unfortunately, the Exhibition itself is uninteresting. I saw nothing very new there: it is always the same bazaar, where one finds gathered together the same furniture, the same bronzes, the same pottery, with which we are already familiar. At present it has no other claim to success than that the concerts, which M. Dambé, the leader of the orchestra of the Opera Comique is giving, are very interesting. So far as the arts are concerned, the art of music is the one best represented at the Palais de l'Industrie.

M. BRINCOURT.

BUILDING MATERIALS.[1] — VII.

IN my last lecture I directed your attention to cements, some of which derive their binding properties from the formation of hydrated compounds of silica, alumina, and lime, and others from simple hydration, or combination with water only. There is, however, another cementing material in very common use, which is of an altogether different character, upon which I have a few remarks to make, commonly known as asphalt, its value depending upon the binding properties of bitumen. Under the general term of bituminous substances are included a variety of inflammable materials found in nature, such as pitch, tar, asphaltum, naphtha, petroleum, differing from each other in consistency, and in various other respects, but all possessing a peculiar and characteristic odor; of these, naphtha is the most fluid, and asphalt the most compact and solid. The largest deposits of this character are those of the Dead Sea and the lake of Trinidad; this tar lake is more than a mile and a half in circumference, and of unknown depth; the bitumen near the shore is solid, but decreases in consistency as it approaches the centre, where the temperature is higher. Extensive bituminous deposits are also found in Auvergne and other places in France, at Seyssel near the Rhone, and elsewhere. The petroleum wells in America and Russia have probably had the same origin as bitumen. These bitumenous deposits are supposed to have resulted from the action of heat and moisture on vegetable substances under pressure, the products of such action which, under ordinary circumstances, would have been evolved as gas, having been compressed into a liquid or solid form. When bitumen is mixed with chalk it forms a compact semi-elastic solid, which is not affected by alterations of temperature, nor reduced to powder by attrition, and such a material is, on account of its plasticity and tenacity, as well as from its being impervious to water, particularly suitable for floors, pavements, and other purposes where it is liable to be exposed to a greater amount of friction. No artificial mixture of bitumenous and calcareous matter is so well adapted for the manufacture of the description of asphalt used for road-making purposes as the natural deposits found at Val de Travers and at Seyssel; its superiority being possibly due to the very perfect manner in which the carbonate of lime is incorporated with the bitumen, owing to the enormous pressure under which these deposits have probably been produced. The native asphalt rock consists, for the most part, of carbonate of lime, more or less impregnated with bitumen, the quantity of which varies from about six to twelve per cent — that from Val de Travers, in the Canton of Neuchatel, containing rather more bitumen than the Seyssel. The prepared asphalt, as sold by the makers, is termed "mastic," for the manufacture of which the asphalt rock is crushed under a steam hammer, and ground to powder by edge-runners. The powdered rock is then carried forward by means of an endless screw to cast-iron vessels placed over a fire, in which it is mixed with suitable proportions of fine sand and bitumen, and kept constantly stirred for from two to three hours, when it is run out into blocks of one hundred and twenty pounds in weight. When the mastic is used, it is reheated with more bitumen, in order to render it sufficiently fluid, more or less coarse sand being mixed with it, according to the purpose to which it is going to be applied. Coal-tar pitch is sometimes used instead of mineral bitumen, but this deteriorates the quality of the asphalt, coal-tar pitch being a hard brittle substance which does not possess the toughness of mineral bitumen; it softens readily when exposed to heat, and pavements made with such asphalt are liable to become soft and adhesive under the influence of a hot sun. Good asphalt should withstand a temperature of from 140° to 160° Fahrenheit without being affected to any appreciable extent, and should not become so fluid as to run down below a temperature of 260° Fahr.

PRESERVATION OF WOOD.

The best means of preserving timber from decay, and enabling it to resist for the longest possible period those changes that are included under the term eremacausis — which may be regarded as a species of slow combustion of the constituents of the wood with the

[1] A lecture by W. Y. Dent, F.C.S., F.I.C., read before the Society of Arts, and published in the *Journal* of the Society. Continued from page 173, No. 615.

oxygen of the atmosphere — is a subject that has for many years occupied the attention of chemists and engineers.

Wood consists of a mass of cells or fibres, the newer portions of which are filled with the particular kind of sap appertaining to each special description, which, when the life of the plant ceases, can no longer resist the influence of the surrounding air and moisture, but begins to be subjected to a process of oxidation as the air gains access to the juices of the sap through the tissues of the wood. These juices consequently begin to ferment and decompose, the albuminous constituents, or those containing nitrogen, being the first to undergo this change, which proceeds from these to the mucilaginous, such as sugar, starch, and gum. This fermentation is assisted by the moisture contained in the wood, and is attended with the appearance of fungoid growth, when it is generally known by the term "dry-rot." This dry-rot fungus possesses the property of secreting moisture, even from a moderately-dry atmosphere, and hence, when once the growth of this fungus commences, it proceeds with rapidity, since it is able to procure for itself the moisture that is essentially necessary for its increase. Unseasoned wood contains within itself the elements of decay, and affords the conditions necessary for the development of the dry-rot fungus. When such wood is placed in situations where there is not a free circulation of air, this fungoid growth soon makes its appearance, and the germs spread rapidly in every direction, the wood becoming, in a comparatively short time, reduced to the condition of fine dust.

When wood is thoroughly seasoned, external moisture is necessary for the commencement of this process of decay; but perfectly dry wood shows but little tendency to alteration, as we find to be the case with the gopher wood found in Egyptian catacombs. Timber of slow growth is less liable to decay than when it arrives quickly at maturity, this being the case even in timber of the same description. It has been stated that telegraph poles made from trees grown in the comparatively-rich soil of Devonshire begin to decay in a shorter time than poles made from the larches grown in the Highlands.

When timber is immersed in water containing air in solution, and the air is constantly being renewed, the woody fibre will, in course of time, be converted into a dark-brown substance, to which the name of *humus* has been given, this being one of the constituents of vegetable mould.

It is well known that the decay of wood under such circumstances is rapid, as is the case in tidal rivers, or in other situations in which the wood is alternately exposed to the action of air and water, as compared with wood immersed in deep water, or in still water that is not changed. The air contained in such water becomes exhausted of its oxygen, and the process of decay is arrested, or may never take place to any extent. Accordingly, it is found that piles driven in deep water, or in clay or mud, will remain sound for an almost indefinite length of time, as was exemplified in the elm piles of old London Bridge which, when taken up, were found to be in a sound condition after the lapse of eight hundred years. Only a few years ago two canoes, each formed from a single log of oak, were recovered in good condition from the bottom of a loch in Aberdeenshire, where they are supposed to have been lying for 1,000 years. More recently, a boat, similar in character to those canoes, was discovered at Brigg, in Lincolnshire; and in 1881, in making excavations for steam docks at Liverpool, a portion of a ship was found which must have been embedded for at least two hundred years, the elm beams of which were in a perfectly sound condition. Besides being liable to gradual decomposition by the ordinary and natural processes of decay, timber is liable to be injured by the attacks of boring worms, the most formidable of which are the *teredo navalis* and the *limnoria terebrans*, and also in hot climates by that very destructive insect, the white ant. The capabilities possessed by different kinds of wood of resisting these attacks vary considerably. Those descriptions which contain a large amount of resinous matter, such as the greenheart timber of Demerara, and pitch pine, *pinus rigida*, are less liable to such attacks than much harder woods which are of a less inflammable character. The greenheart timber contains so much empyreumatic oil that it is known by the name of torchwood, on account of its burning freely, like pitch pine, and there is no doubt that it is from the presence of this oil that it derives the power which it possesses of resisting these attacks to a greater extent than most other descriptions of wood. There are other woods that are reputed to have similar capabilities of resistance, of which there were a number of very fine specimens in the Colonial Exhibition. Amongst these may be mentioned the billian, a hard, very dense wood, and the russak wood from North Borneo; the cypress pine from Queensland; sneezewood from the Cape of Good Hope; horseflesh-mahogany from the West Indies; the karri (*eucalyptus diversicolor*), growing sometimes to the height of three hundred feet, and the jarrah (*eucalyptus marginata*), of which there was a beautifully-polished specimen in the Exhibition from Western Australia. This wood was used for a portion of a jetty at Perth, on the Swan River, Western Australia, and remained perfectly sound after the lapse of thirty years.

Greenheart timber was, for a long time, considered to be safe from the attacks of boring worms, but the experiments carried out some time ago by the Dutch Government with this as well as with other descriptions of wood, show that none of these woods can be thoroughly depended upon when placed in situations most favorable to the increase of these destructive agents. The extension of the railway system gave rise to the employment of an immense number of wooden sleepers, and the rapidity with which they were found to decay rendered some means of preserving them an absolute necessity, and accordingly we find that various methods have, from time to time, been proposed for the preservation of timber, some of which have been carried out in practice with more or less successful results. The efficacy of any such process depends upon the power of the material employed to so change the sap as to render it not susceptible of putrefaction, while it imparts to the wood such properties as will be unfavorable to fungoid growth, and will render it to a considerable extent repellent of water. The first process to receive any extensive practical application was that known as kyanising, which was the subject of patents taken out in 1832 and 1836 by Mr. Kyan, and consisted in steeping the wood in open tanks in a solution of bichloride of mercury, commonly known as corrosive sublimate. The impregnation of wood with a salt which is known to be so fatal to animal life could scarcely fail to prove effective; and this process was for many years very generally adopted. The cost was considerable, as to render the process efficient it was necessary to employ a solution containing one pound of the mercury salt to four gallons of water, and a load of timber was found to absorb as much as from six pounds to seven pounds of the salt. This process has for many years been to a great extent superseded by others of a less expensive as well as more effective character, since although the use of corrosive sublimate was perfectly successful in dry situations, it did not always prove so satisfactory when the wood was subjected to the action of sea-water.

Chloride of zinc is a salt which has long been known to possess considerable antiseptic qualities, and in 1838 a patent was taken out by Sir William Burnett for the use of this salt as a preservative of wood. In carrying out his process he adopted the apparatus first proposed by M. Bréant in 1831. The wood was placed in closed iron cylinders into which, after exhausting the air, a solution of zinc chloride was admitted, and then forced into the pores of the wood under a pressure of one hundred and fifty pounds to the square inch. This process was employed on a considerable scale for many years, but it has now given place to more efficient methods, although it is still used to some extent in Germany.

Some years ago a number of experiments were carried out by Dr. Boucherie, who very ingeniously availed himself of the force of the ascending sap in growing trees, by causing it to draw up various solutions. A large incision was made in the lower part of the tree, round which a trough of clay was placed, filled with the preservative solution to be tried, and this was carried up with the ascending sap. When experiments were made with felled timber, the trunk was immersed in a closed vessel which was filled from a reservoir placed at a considerable height above, so as to obtain a pressure of thirty or forty feet, and in this manner Dr. Boucherie succeeded in replacing the sap of the timber by solutions possessing properties which were likely to preserve the wood. Of the various salts experimented with, copper sulphate gave the best results. This method of applying the solution was adopted for a short time in France; it possesses the advantage of requiring no machinery, and of being capable of application upon the spot, and hence it has sometimes been found useful for newly-cut wood required for telegraph-poles. The peculiar action which copper salts exert upon cellulose has long been known, and in 1837 a patent was taken out by Margary for the use of sulphate of copper as a preserving agent for timber. This salt was extensively employed for many years, the impregnation of the wood being accomplished by the use of exhaust and force pumps, and it subsequently became the process most generally adopted in France. The effect of copper salts in the preservation of vegetable fibres from decay is strikingly illustrated in the case of what is known as the Willesden canvas. Fabrics of canvas or paper can be made perfectly waterproof by the action of a solution of the copper salt employed in the Willesden process; they are free from liability to mould, are not injured by wet, and are rendered capable of resisting the attacks of vermin of every description. This canvas has been used in the most trying climates, such as Egypt and India, and was employed by Stanley in fitting out his expedition to Africa. The copper solution employed is prepared by simply dissolving hydrated oxide of copper in strong liquid ammonia. The goods to be subjected to this process are passed through a bath of this solution, at such a rate as to cause the exterior portion of the fibres of the canvas or paper to become pectized or gelatinized, without allowing sufficient time for the action of the copper-salt to proceed so far as to injure the strength of the material; the canvas is then passed over drums, such as are used in ordinary paper-mills, and dried, whereby the film of pectized cellulose is converted into an insoluble varnish. The paper or canvas can be made of any required thickness by passing two or more at the same time through the bath, pressing them together, and then drying, thus producing a material of sufficient strength for the purposes of light roofing.

By far the most important of all the methods now employed for the preservation of timber, and adopted almost to the exclusion of all others in England, Belgium and Holland, is that known by the name of creosoting, which consists in impregnating wood with an oily liquid termed "dead oil," or heavy oil of tar, obtained in the distillation of gas-tar.

The efficacy of pitch, tar and bituminous substances generally, as preservatives from decay, has been recognized from a very remote period, as we learn from the historical records of the Egyptians, Greeks and Romans. The Egyptians undoubtedly displayed very

great skill in the manner in which they conducted their processes of embalming. Bitumen, in one form or other, appears to have been largely employed, and their success could hardly be more strikingly exhibited than in the case of the heart of an Egyptian mummy which, after having been preserved for some 3,000 years, began to decompose upon the removal of the antiseptics employed. In the writings of Herodotus and Pliny we find a description given of pitch, tar and resin, and from the latter celebrated writer we learn that the Romans were acquainted with the fact that timber was less likely to decay when kept continuously under water than when exposed alternately to the action of air and water, and also that they knew something of the destructive powers of the teredo.

The application of tar distillates to the special purpose of the preservation of wood was proposed as far back as 1754, when a patent was taken out for a varnish prepared from the American pitch pine, and for a product obtained from the distillation of tar to be applied as a preventative of decay in wood. In 1838, and again in 1848, patents were taken out by Mr. Bethell for the use of tar liquor.

There is perhaps no practical application of chemical science to manufacturing operations that has yielded such splendid results as have attended the investigation into the nature and composition of coal tar. Fifty years ago, no one would have ventured to surmise that in what was then regarded as an almost valueless, dirty and evil-smelling waste product, obtained in the purification of gas, would be found the source from which would be produced a most splendid series of organic products that would not only rival the colors obtained from indigo and madder, but in many cases supersede them altogether, and create an entire revolution in the whole system of dyeing.

In distilling coal tar on a manufacturing scale, it is placed in a large iron still capable of holding about 2,000 gallons, heated by a furnace underneath, sometimes assisted by the injection of steam, and the application of an exhaust air-pump. As the still becomes heated, a light naphtha distils over between about 170 degrees and 320 degrees Fahr., which is of great commercial importance, inasmuch as it contains benzole or benzine, from which is obtained aniline, the basis of a series of colors, such as mauve and magenta. Between the temperatures of 320 degrees and 370 degrees Fahr. is distilled the liquid known as coal-tar naphtha, which is used so extensively for burning in lamps, and as a solvent for India rubber. The liquor used for creosoting timber, termed "dead oil," or heavy oil of tar, from its being heavier than water, distils over between 370 degrees and 750 degrees Fahr.; the resolution in the still is run out whilst hot, becomes perfectly solid on cooling, and constitutes the substance known as coal-tar pitch. This dead oil, or creosoting liquor, is of a very complicated character, consisting of a variety of hydrocarbons of different degrees of volatility, and possessing by no means the same antiseptic properties, the relative value of which, in this respect, it is difficult to estimate with any degree of accuracy. In the lighter portions are found carbolic and cresylic acids, substances which have long been known as possessing very great disinfecting properties, so much so, that for a long time they were regarded as the active agents upon which the value of the creosoting liquor (as a preservative agent for wood) depended. Within the last few years, however, the opinions of chemists have undergone considerable modification in this respect, and there appear to be sufficient grounds for believing that the relative value of creosoting liquors is not represented by the percentage of these acids which they may contain, since, owing to their volatility, they are not retained by the wood for so long a time as some of the other constituents. In the heavier portions of the liquor, or "green oil" as it is termed, distilling over between 550 degrees and 750 degrees Fahr., are found a number of alkaloids, or bases, amongst which is a powerful germicide of a very pungent and acrid character, termed "acridine," which having a very much higher boiling point than that of carbolic or cresylic acids, is more permanently retained by the wood. The minute glistening scales generally observable on recently creosoted wood, consist of naphthalene, a substance that possesses considerable antiseptic properties; when this substance exists in the liquor in moderate quantities, it thickens and improves its consistency; but when there is a very large proportion, as is frequently the case with creosoting liquor obtained by the distillation of coal-tar produced at gas factories in which Newcastle coal is employed, it makes the liquor too solid. To be of proper consistency the liquor should be completely fluid at 100 degrees Fahr., and should exhibit no signs of any deposit on cooling down to a temperature of 90 degrees Fahr.

There are two classes of creosoting oil, known in the trade as London oils and country oils. The London oils, which consist of those obtained from the gas-tar derived from Newcastle coal, contain a larger proportion of naphthalene, and are heavier and thicker than the country oils of the Midland districts, which yield a larger proportion of tar acids (as they are termed), consisting of a distillate which is capable of being dissolved by a solution of caustic soda containing nine per cent of the alkali. Previous to the year 1863, only a comparatively small quantity of these thin country oils had been used for creosoting purposes, but they subsequently became more in demand, under the impression that the value of the oils depended upon the proportion of tar acids they contained. This question was investigated in 1866 by Mr. Coisne, an engineer in the service of the Belgian Government, whose experiments were continued during a period of five years, and the results obtained led him to the conclusion that the so-called green oils, distilling over at high temperatures, formed the best portions of the creosoting liquor, and that the importance of the tar acids had been much overrated.

In carrying out the creosoting process on a large scale, the dried wood (cut up into the sizes in which it is going to be used) is placed upon iron trucks, which are run on a tramway into large air-tight cylinders six feet in diameter, and from twenty feet to seventy feet in length, heated by steam-pipes placed along the bottom. When the trucks have been run into the cylinder, the end is closed, steam is admitted to the heating pipes, and an exhaust-pump is put in action which is capable of creating a vacuum of twenty-five inches. When this has been attained, the creosoting liquor is admitted from a reservoir, in which it has been kept at a temperature of 120 degrees Fahr., by means of steam pipes. A force-pump is now put in action, by which a pressure of 150 pounds on the square inch is maintained for a period of from six to ten hours, the temperature of 120 degrees Fahr. being also kept up by means of the steam-pipes; the amount of pressure given, and the length of time that the steeping is continued, depends upon the description of wood to be treated, and the quantity of creosote that is required to be absorbed. When cost is no object, the penetration of the liquor as regards some descriptions of wood which absorb the most readily, such as beech and deal, is capable of being extended to a depth of ten inches, but, as the process is usually carried out, the penetration does not extend further than from half-an-inch to four inches. The progress of the absorption of the liquor by the wood is ascertained by observing the quantity left in the reservoir, which is registered by a gauge, the amount usually required being about one gallon to a cubic foot of timber of the sizes employed as railway sleepers. When the wood has absorbed this quantity, the pressure is removed, the liquor remaining in the cylinders is run off, the end is opened, and the trucks with their loads of creosoted wood are withdrawn. I have stated that in carrying out the creosoting process, as above described, it is necessary that the timber should be dry. Now it is well known that timber is injured by exposure to a dry heat, 230 degrees Fahr. being the extreme limit to which it can be exposed without liability to injury, and all attempts that have been made to effect the drying by stoves, currents of hot air, or superheated steam, have had to be abandoned; but by a modification of the creosoting process patented by Mr. Boulton, the moisture can be removed at the commencement. For this purpose a dome is fitted to the top of the cylinder, the liquor is admitted at a temperature only slightly exceeding 212 degrees Fahr., and the action of the exhaust-pump is continued for some time after the admission of the liquor.

It will be seen that the wood is thus subjected to a moist heat above the boiling point of water, by which the water in the pores of the wood is converted into vapor and drawn off by the action of the suction-pump, the creosoting liquor taking the place of the water withdrawn from the wood. When the creosoting process has been properly carried out, the wood will be found to have increased in weight to the extent of from eight pounds to ten pounds per cubic foot, and to have been rendered so secure against the attacks of the marine boring worm, that a piece of timber has been known to have been riddled by such attacks in places where the liquor has not reached, and to be untouched where it had been properly impregnated with the creosoting liquor. This tar liquor not only possesses those antiseptic properties by which fermentation and the growth of insect life is arrested, as well as the power of coagulating the albumen of the sap in the same manner as in the case with copper sulphate or corrosive sublimate, but it also possesses the additional advantage of impregnating the wood with a liquid of an oily nature which is repellent of water. The efficacy of this process, and its superiority to all others that have been yet tried, is supported by the results of numerous experiments that have been made with great exactitude and care, both in this country and abroad, by engineers and others. There is no country so deeply interested in the protection of timber as Holland, on account of its having such a large extent of coast protected from encroachments of the sea by dykes that are constructed of timber. On several occasions fears have been entertained of large portions of the country becoming submerged owing to the destruction of the timber dykes by the ravages of the teredo, which works with such rapidity that in some instance piles have been known to have been eaten away to a dangerous extent in the course of a few months. The question of the preservation of their timber piles became one of national importance to the Dutch Government, and a commission was appointed, consisting of engineers and members of the Royal Academy of Amsterdam, to institute a thorough investigation of the subject. The experiments carried out by the commission were divided into three groups:

1. Applications to the surface of the wood: which included carbonizing or charring the wood, by subjecting it to a high temperature; treatment with paraffine; covering with sheet copper or zinc; covering with broad flat-headed iron nails, driven in close together and allowed to rust.

2. Impregnation with different liquids, including solutions of sulphate of copper, sulphate of iron, acetate of lead, water-glass, chloride of calcium and creosoting.

3. Different kinds of unprepared wood.

The conclusions that they arrived at were: That the only reliable process for protecting wood from the attack of the teredo was that of creosoting, and that even this fails if the process has not been properly carried out; that no kind of unprepared wood (greenheart

included) is to be altogether relied upon as secure against the attacks of the teredo.

The descriptions of wood used in the construction of the dykes are fir, beech and poplar. Some time ago twelve piles of each of these woods were sent over to this country to be creosoted, these were returned to Amsterdam, and placed in positions where improperly creosoted wood had previously been destroyed, and in no instance were any of the twelve piles attacked by the teredo. Some years ago experiments were made at Plymouth with different kinds of wood, consisting of red and yellow pine, American and English oak, elm, beech, fir and pitch pine, which, after being dried in an open shed, were subjected to the following processes, viz., creosoting (one gallon of the liquor per cubic foot being forced into the wood), kyanizing, and the sulphate of copper process. Blocks of each kind of wood, after being subjected to the several processes, as well as others without any preparation, were sunk in still water to the depth of twenty feet, and, after remaining for two-and-a-half years, were taken up and examined. All the creosoted pieces were found to be sound, and all the unprepared pieces were worm-eaten. Of the kyanized, five were sound and three slightly attacked; and of those prepared by the sulphate of copper, only one was sound. The increased use of creosote is shown in a report of July, 1884, to the Technical Convention of the German Railway Union, in which it is stated that in 1865 there were fifteen railway companies in Germany employing the sulphate of copper process, and only four the method known as creosoting; but that in 1884 there was only one using the sulphate of copper process, whilst eleven had adopted that of creosoting.

We have now had nearly fifty years' experience as regards creosoted timber. Wood so prepared was employed in the construction of dock gates at Monk Wearmouth as far back as the year 1839; creosoted wood was also employed on a considerable scale, in 1846, at Lowestoft. The evidence that can be produced of the value of this process as a means of preserving wood so far exceeds anything that has been advanced on the part of any other, that its claim to be regarded as superior to all other processes at present known, and as that upon which the greatest reliance can be placed, may be considered as fairly established.

The teredo is a gray-colored worm, ordinarily, when full grown, about ten inches or twelve inches in length, but in favorable situations (such as the Gulf of Mexico) it will sometimes attain a length of twenty-three inches. It is a species of mollusc, having at one extremity a boring apparatus of the most perfect description, consisting of a hard, shell-like substance, which fulfills the part of an auger and a rasp. The teredo first makes its appearance in the form of a very minute egg; the eggs are laid at the commencement of the warm season, and are hatched in the water, giving out larvæ so small as to escape notice of the inexperienced observer, being not more than about one-twenty-fifth of an inch in length. After swimming about for a day or two, they begin to search for timber, which they enter by boring a very minute hole not larger than a pin's point; it is therefore of the greatest importance that no portion of the surface of the wood should be left unprotected by the preserving agent employed, and hence arises the necessity for cutting up the wood into the sizes in which it is to be used before submitting it to the creosoting process. The teredo grows rapidly under favorable circumstances, enlarging its hole as it increases in size. Its smaller end (consisting of two tubes) is attached to the end of its burrow, whilst its other extremity, armed with the auger, is pushed forward into the wood, the length of the tunnel corresponding with that of the teredo. As it progresses, it deposits a coating of carbonate of lime upon the sides of its cell, in which it continues to increase for from twelve to eighteen months, and then dies, after blocking up the entrance to its burrow with carbonate of lime. This stopping is soon penetrated by the water, which washes out the lining, leaving a smooth clean hole to bear witness to the destructive habits of this dangerous enemy to wooden structures. The teredo perforates in the direction of the grain of the wood as far as possible, but on meeting with a knot or anything which it regards as obnoxious, it avoids the obstacle by working round it, or it will work back and begin a branch tunnel, taking care to seal up the abandoned portion of its cell with carbonate of lime. It is a curious fact that although there may be hundreds of these worms in the same piece of timber, they never break into a neighbor's tunnel, although they will cut away within a hair's breadth of each other, or of the outside of the timber. A division, however thin, is always left intact. The teredines thrive best in salt water and in warm climates, muddy fresh water being destructive to them.

[To be continued.]

A Runic Inscription at Schleswig.—The *Hamburger Nachrichten* reports the finding in the town of Schleswig of a large stone with a Runic inscription. A new barrack is being built on the ruins of the old castle of Gottorp, erected in the sixteenth century, and in demolishing the old foundations the workmen laid bare this stone in perfect condition. It stands about 120 centimetres (nearly four feet) high, and is about a foot broad. It has an inscription in the usual characters on two faces, and the style of the writing is said to correspond with what has been found on three other similar stones found in Schleswig or the neighborhood. It is in the line of the dyke known as the Dannewerke, and probably covered a grave. The inscription has been partially deciphered, and is said to probably run as follows: "Osfrida made this mound, the daughter of Vinthingar, to Sigtrig, the King, her son, on the holy place."

SOCIETIES

AMERICAN INSTITUTE OF ARCHITECTS.

In accordance with the previous notice of 1st September, the Twenty-first Annual Convention of the Institute will be held on Wednesday, Thursday and Friday, October 19, 20 and 21, 1887, at Chicago, in the rooms of the Literary Club, in the Art Institute, corner of Michigan Boulevard and Van Buren Street.

Order of Proceedings.

first day.—morning session, 10 a. m.

1. Opening address, by Pres. Thomas U. Walter, LL.D., or, in his absence by First Vice-Pres. Edward H. Kendall.
2. Report of the Board of Trustees.
3. Report of the Treasurer, and appointment of Auditing Committes thereon.
4. Reports of the standing committees on (*a*) Education and (*b*) Publications.
5. Reports of the Chapters in Baltimore, Boston, Chicago, Cincinnati, Indianapolis, New York, Philadelphia, Rhode Island, San Francisco, St. Louis and Washington.
6. Report of the Secretary for Foreign Correspondence.
7. Appointment of Nominating Committee for the election of officers and standing committees for the ensuing year.
8. Reports of Special Committees:

(*a*). On bill to provide improved methods in the Architectural Service of the Federal Government; in conference with Special Committee of the Western Association of Architects.

(*b*). On Architects' Protective Associations.

(*c*). On providing a permanent home for the Institute.

(*d*). On a building contract for use throughout the United States; in conference with Special Committee of National Association of Builders, U. S. A.

9. Appointment of Special Committee for the consideration of all reports presented to the Convention.
10. Communications, announcements, and miscellaneous business.

recess.

The Convention, as the guests of the Chicago Chapter of the Institute, and of the Illinois State Association of Architects, will, after each morning session, take lunch together; and, on such afternoon as may be announced at the first session, their hosts will drive them to points of architectural interest in the city and vicinity.

evening session, 8 p. m.

Exhibition of illustrations of work executed, within the last ten years, by such practitioners as may have responded to the official invitation to be issued by the Western Association of Architects, and of which preliminary notice, at the Association's request, was given by the Secretary of the Institute in his circular letter of 1st ultimo, to Institute Fellows and Associates.

second day.—morning session, 10 a. m.

1. Unfinished business.
2. Amendments to By-Laws.
3. Report of Nominating Committee.
4. Report of Special Committee, for the consideration of reports.
5. Election of officers and standing committees.
6. Reading and discussion of papers.

The following papers, among others, on themes suggested to the authors, have been promised; and several are already in the hands of the Committee of Arrangements:

By Mr. D. Adler, Fellow, on "Theatres."

By Mr. M. E. Bell, Fellow, late Supervising Architect of the U. S. Treasury Department, on "The National Building Question."

By Mr. W. W. Boyington, on "Differences between the Methods of Architectural Practice prevalent now and fifty years ago."

By Mr. D. H. Burnham, Fellow, on "Suggestions towards the best and speediest methods for harmonizing and utilizing all the architectural societies in the United States, so as to secure the most good for architecture, for the public, and for the profession in America; due regard being had as concerns means, alike to individual energy and enthusiasm, and to associative experience; and, as concerns ends, alike to local sentiment and to national reputation."

By Mr. J. C. Cady, Fellow, on "Opera Houses."

By Mr. Chas. H. Harn, on "Manual Training as applied to the Building Arts."

By Mr. John Moser, Fellow, on "Federal Buildings for Judiciary, Customs and Postal Service."

By Mr. J. L. Smithmeyer, Fellow, on "Library Buildings."

By Mr. J. M. Wilson, Fellow, on "Where the line of demarkation between Engineering and Architectural Practice is to be found."

7. Communications, announcements, and miscellan ous business.

recess.—lunch.—evening session, 8 p. m.

1. Unfinished business.
2. Reading and discussion of papers continued.
3. Communications, announcements, and miscellaneous business.

THIRD DAY. — MORNING SESSION ONLY, 11 A. M.

1. Unfinished business.
2. Reading and discussion of papers concluded.
3. Miscellaneous subjects and discussions.
4. General business, communications, announcements, resolutions of thanks, and adjournment.

There are two eligible hotels — on the European plan — in the immediate vicinity of the Convention's place of meeting; one, the Leland Hotel, Michigan Boulevard, corner Jackson Street, where rooms may be had from $1.50 per day upwards; the other, the Richelieu Hotel, Michigan Boulevard, between Jackson and Van Buren Streets, where luxurious quarters may be had at from $2.50 to $20 per day.

Visiting members will find, at the meeting-room of the Convention, a visitors' book in which they are particularly requested to register, promptly on arrival, their addresses, both at home and in Chicago; residents of Chicago will also please register.

Although, owing to the impossibility of getting the promise of attendance at the Institute Conventions in sufficient numbers, as well as to the widely-separated points from which members — often but a single individual from one place — start for the point of meeting, it has hitherto been found impracticable for the successive Committees of Arrangements to secure a general system of reduced rates for railroad travel; it is, nevertheless, suggested — and it has indeed been found feasible in several cases heretofore — that, if the various Chapters, each in its own locality, will organize a visiting delegation to the Convention, they may, through their local business and social connections, induce the railroad officials, in their several places of residence, to reduce rates for a dozen or even for a half dozen friends or acquaintances to a figure which would be refused, to an isolated individual, and a proposition for which, unless on the understanding of tickets being taken by the hundred, as usual where conventions are concerned, would receive no attention whatever if made by a distant Committee of Arrangements.

All reports or communications for the Committee of Arrangements should be mailed in time to reach the Secretary, A. J. Bloor, 18 Broadway, New York, before the 14th inst., so as to give the Committee time for study and proper classification before leaving for the Convention; but when delay beyond that date is unavoidable, they may be forwarded direct to Mr. H. L. Gay, 15 East Washington Street, Chicago. He will also, on account of the Institute, receive illustrations for the Exhibitions hereinbefore mentioned.

They should be in his hands by the 12th inst., and an invoice thereof should be mailed to him.

1st Oct., 1887. [Seal A. I. A.] W. L. B. Jenney, E. T. Littell, Henry Lord Gay, A. J. Bloor, } *Committee of Arrangements.*

COMMUNICATIONS

DISPUTED COMMISSIONS.

September 22, 1887.

To the Editors of the American Architect: —

Dear Sirs, — We have a case of disputed commissions and bill for partial service, which we would like to submit to you for advice.

Last July a client from another city came to see us and instructed us to prepare sketches for a dwelling to cost $9,000, and for a barn to cost $1,000. We did so and went to see him and submitted them. As they were not entirely satisfactory we made changes in them, and also made entirely new designs according to his suggestions. These we again submitted, spending the greater part of a day looking them over and making slight alterations. He took them home to look over more at leisure, and seemed to feel pretty well satisfied that they would suit, and said he would write us the result.

On August 19 we received a letter saying that as there were several things about the plans that were not just as desired, and as the season was so far advanced they thought they had better not attempt to break ground this fall, and that if they waited till spring they could have a long time to get everything ready.

On September 12 we received another letter saying they had written to another firm of architects for plans, which were sent immediately and were so entirely satisfactory that they accepted them, and saying that our plans not being entirely satisfactory, they hoped we would not feel in the least offended, and if we would send a bill they would remit at once.

We sent bill for preliminary studies, one per cent on $10,000, and travelling expenses $4.87, making total bill $104.87.

In reply we received letter saying they begged to enclose check for $35 in payment for our time and travelling-expenses, which they "considered sufficient compensation," and that they thought bill rendered very much too high.

We returned the check for $35, saying we would not accept it in settlement of account, and explaining that our charges were the usual and proper ones, and enclosing a copy of the schedule of charges of the American Institute of Architects.

In the course of the above correspondence we asked our client to return us the sketches at his convenience — which he has done.

We want to ask you for information on two points:

1. To whom do the sketches belong now?
2. Is not our claim perfectly just and proper, and can it not be collected by law?

By advising us in regard to this matter you will confer a very great favor upon Yours respectfully,

"Architects."

[The charge is perfectly proper and reasonable. Under the present state of the law, however, the client should be permitted to retain possession of the sketches. He would not, of course, use them without further proper compensation to the designer, but the courts would sympathize with him in thinking that he ought to have something to show for his money. — Eds. American Architect.]

Riverside, Cal., September 27, 1887.

To the Editors of the American Architect: —

Dear Sirs, — Have bought the first sample copy of the *American Architect*, and if "X. and Y.," on page 139, No. 612, Regular Edition, will read page 13 of *Carpentry and Building*, January, 1887, they may, by inquiring of the editors of said paper, receive information which may be of help in their case.

Yours respectfully, E. E. Blyler.

CONTINUOUS GIRDERS.

To the Editors of the American Architect: —

Dear Sirs, — I have been discussing a very trivial question of construction with some strangers to the profession, and as they are somewhat prejudiced towards me, you would confer a favor in stating which way is best of constructing beams supported on iron columns, viz.:

The first method would be to get beams of 14″ x 12″ of 36.0 feet length. The second, to get them in 18.0′ long. The third, to make them of 3″ joists bolted together with alternate joints. In all cases to bear a floor for a public edifice.

If you think the thing proper, please give an answer in your nearest issue of the *American Architect*, and oblige,

Your obedient servant, X.

[The third method would, we think, be the strongest, with beams 36 feet long, breaking joint and thoroughly bolted. Next to this, the first method would be the best. — Eds. American Architect.]

ARCHITECTS SHOULD CONSULT SPECIALISTS.

New York, October 4, 1887.

To the Editors of the American Architect: —

Dear Sirs, — Referring to the editorial comments in your last issue on the subject of heating and ventilating buildings, it seems to me that even in those [too rare] cases in which architects have some true knowledge of these matters, it is to their own and to their clients' interest to consult and be guided by the advice of professional engineers [not contractors], who make this work their specialty. To decide correctly on the most economical and best generation and distribution of steam, the most economical and effective flow of air, ventilation, and the like, and to devise the best system in any particular case, demands a special knowledge and experience, which can, as a rule, only be possessed by the trained engineer, who has devoted years of study and practice to this department of work. It is certainly preferable to put faith in the unbiased, experienced engineer than to rely, as is so frequently done by architects, on the [one might also say *necessarily*] biased contractor. Alfred R. Wolff.

TIN *VS.* GALVANIZED-IRON FOR ROOFS.

Ashland, Wis., October 5, 1887.

To the Editors of the American Architect: —

Dear Sirs, — Will you kindly give your opinion regarding which would make the best and most-lasting roof for a building with the pitch as low as ½″ to 1′; one covered with galvanized-iron No. 26, with standing seam, or one covered with I C roofing tin with locked and soldered joints? It is claimed here that contraction and expansion will make the galvanized-iron crack in a short time. As there are divers opinions regarding it, I would be pleased to have yours. Respectfully yours, W. H. W.

[We should much prefer the tin roof. — Eds. American Architect.]

NOTES AND CLIPPINGS

How Mirrors are made. — One of the factories in Chicago employs some one hundred and fifty men and boys, and its spacious four floors present an interesting series of sights to the visitors whose nerves are steel and tympana proof against splitting. On the first floor he will see huge stacks and piles of glass in assorted sizes, ranging from sixteen feet by seven feet squares down to the smallest ovals for mirrors. These are all polished, some being run over huge felt-colored wheels kept powdered with rouge, and the larger sheets scrubbed by sweating toilers with hand-blocks covered with felt, like a printer's proof-planer in rouge. After the glass is thoroughly polished it is taken up to the next floor, where it is laid on tables and cut into the sizes ordered. It then passes into the hands of the bevellers, who, with

sand and water and large grindstones, artistically finish the edges of the glass. It takes a trip upward again, to another floor, and is once more put through a polishing process to remove any scratches or blemishes that may be on the glass. After every spot or scratch, no matter how minute, has been removed, careful hands convey the now beautiful and sparkling glass to the room where it goes through the final process, the silvering. Huge tables of cast-iron or stone, made like billiard tables, with raised edges, are used in the silvering-room. These tables are of great strength and solidity, and all around the edge is a drain, for the superfluous mercury is poured over the tables in quantities sufficient to float the glass, which, after being tinfoiled, is gently and carefully pushed across the table containing the mercury. Great care must be used to prevent blemishes, the least speck of dust being ruinous to the mirror. Mercury, like molten lead, is always covered with a dirty-looking scum which cannot be removed by skimming. The least bit of this scum would spoil the mirror, so the difficulty is obviated by shoving the scum along with the edge of the glass. After successfully floating the glass on the mercury, a woollen cloth is spread over the whole surface and square iron weights are applied until the whole presents a compact mass of iron, two or three pounds to the square inch. After this pressure has been confined for ten or twelve hours, the weights are removed and the glass placed upon another table of wood with a slightly-inclined top. The inclination is gradually increased until the unamalgamated quicksilver had drained away, and only the perfect amalgam remains, coating the glass and perfectly adherent. This ends the process, and the erstwhile rough piece of plate-glass emerges from the silvering-room a gorgeous mirror. — *Western Manufacturer.*

New Uses for Wood Pulp. — In the article on wood-pulp pails, in *Engineering*, July 1, page 21, allusion was made to only a few of the uses to which this form of wood pulp has been applied. That specific method of manufacture and subsequent treatment has been used in the production of piping, which is screwed into iron couplings. Such pipe has been shown to be unusually adapted for conveying anything not of high temperature or strongly alkaline; it is impervious to leakage or attacks from anything in the earth in cities, and is especially suited for water-pipes, illuminating and natural gas, while recent investigations upon its electrical conductivity have encouraged its promoters in offering it as the ideal material for tubes or conduits for underground electrical wires, which is at present a disturbing element in the local self-government of American cities. It is also used for storage and galvanic-battery jars, and also for a great number of domestic utensils. Other forms of wood pulp have been fashioned into boards for construction of dwelling-houses, and special forms of such paper is made into hard sheets for roof coverings which are exceedingly durable and very light, weighing only one-half pound to the square foot, or about one-tenth that of slate and one-fifth as much as shingles, and far less than any other form of roofing. Such coverings, although easily combustible, are rendered almost fireproof by covering both sides with a coat of paint made from iron ores. The sheets are laid with great rapidity, beginning at the top and working towards the lower part of the roof, securing them by nails driven through tinned iron washers about an inch in diameter. Such coverings have been tried on a missionary station in Siberia, where the white ants destroy almost everything, and it was found that the oil treatment did not commend itself to the omniverous appetite of these tropical pests.— *Engineering.*

Blast-furnace Slag no longer a By-Product. — Blast-furnace slag has been in the past as complete a waste as any by-product in manufactures, but the next five years will probably see it playing as important a part in the profits of iron furnaces as by-products do in gas works. The basic slags, with a large percentage of phosphorus, are already profitably used in the manufacture of phosphatic manures, and other slags have been for some time converted into what is known as "mineral wool," of use in building as a non-conductor. The next step taken is to turn this "wool" into the raw material for the manufacture of glass and porcelain, cheaper than sand or clay, and offering color combinations of great beauty. The first step in this process was taken four years ago, and the *Engineering and Mining Journal* expresses the opinion that "when our iron markets shall have fallen to the unprofitable figures which they have witnessed in the past, and that are surely approaching in the future, our blast-furnace owners will find the value conferred upon the slags by this improvement to be no inconsiderable item." — *Philadelphia Press.*

The First Inventor of the Lightning-rod. — If we are to believe an Austrian paper, says *La Lumière Electrique*, the first lightning-rod was not constructed by Franklin, but by a monk of Seuftenberg, in Bohemia, named Prohop Diwisch, who installed an apparatus the 15th of June, 1754, in the garden of the curate of Prenditz, Moravia. The apparatus was composed of a pole surmounted by an iron rod supporting twelve curved-up branches, and terminating in as many metallic boxes, filled with iron ore and closed by a box-wood cover, traversed by twenty-seven sharp iron points, which plunged at their base in the ore. All the system was united to the earth by a large chain. The enemies of Diwisch, jealous of his success at the court of Vienna, excited the peasants of the locality against him, and under the pretext that his lightning-rod was the cause of great drought, they made him take down the rod which he had utilized for six years. What is most curious is the form of this first lightning-rod, which was of multiple points, like the one which M. Melseu afterward invented. — *Fire and Water.*

It is an unusual time in the year to speak of an improving tendency in real estate, yet upon the testimony of very reliable operators, and of some architects and builders, such a statement can be made. It might be thought that with all the conserving influences which have been at work during the past month or two, that real-estate operations would be more guarded. The transfers are numerous, and a large percentage of them, for larger than usual amounts. It is to be noticed that a great deal of real estate in the larger cities and towns is changing hands. There seems to be a growing demand for city sites, and those who have a keen eye for the future are securing desirable localities in advance. It is regarded as a good investment to purchase unimproved city property at present valuations. It is reasonable to expect this improvement, when the conditions are carefully viewed. The population of all our large cities is increasing; manufacturing is expanding; the volume of business is increasing, and a suburban population is growing — all of which have a reflex influence upon city property, improved and unimproved. This buying-up of property is going on in nearly all of the larger cities North and South. Many of the purchases are being made for building purposes — work to be begun next spring. In Chicago, St. Louis, St. Paul, and some of the newer cities farther West, there is an improvement in both city and suburban property, which promises to be continuous. The large cities will no doubt grow larger, and within five years unimproved property, which can now be purchased at from one hundred to a thousand dollars per acre, will be worth ten times those figures. Local capitalists are operating in this direction, and see in it better and safer opportunities than in any other. The only point in referring to this tendency is, to gather from it the evidence or proof of the statement that building activity next year will be no less than this. The contrary statement has been made by some high authorities; this factor in the problem has been overlooked. All of the staple products are in active demand. Iron, steel, wool, cotton, petroleum, are all selling well, and are being protected by trade and other combinations which, perhaps, may be growing too fast, and gaining too much control for the best good of the greatest number. The circumstances of the country invite powerful trade combinations, and they will, no doubt, grow in number and control until the element of evil within them generates the necessary reactionary influences to overturn them or to limit their activities. There is a growing apprehension in the public mind against these combinations, and combinations of any kind designed to control or restrict the natural law of competition; but these influences are natural in trade and manufacturing. Every combination of capital or of enterprise must have within itself a self-asserting power, and these combinations are the visible evidences of it. So far, they have done but little harm; but the public sentiment which is being aroused against them will no doubt exert a healthful influence in restraining a too-grasping policy. The steel-rail makers who combined a year and a half ago and advanced prices from $26 to $42, are now glad to sell at $35, and it is intimated that they will be glad to sell at a dollar or two less per ton before the opening of the year. The iron-makers generally are crowded with orders, but not to such an extent as to enable them to advance prices a farthing. The textile manufacturers throughout New England have been encouraged by the declaring of encouraging dividends, and numerous combinations and enlargements have been resolved upon, which justify the conclusion that that industry is gaining ground. The fact that two-thirds of the loom capacity of the country is practically sold up to production may be regarded as the strongest kind of testimony as to the prosperous condition of that mighty industry. The progress made in the Southern States is in the direction of the cheaper and coarser grades. That tendency has done more to stimulate capacity in the North to push out into higher textile fields than anything else. The effect, in the long run, will be that the competition which a year or two ago was foolishly feared, will result in the production of grades and qualities of goods which will drive out or check importations which now imagine themselves to be upon a firm footing. The manufacturers of all kinds of electric, motive, and wind-mill power continue to book a great deal of business for next winter and spring. It is to be regretted that there are no means for ascertaining the actual progress made in this important field. All of the great machinery-making establishments are greatly over-crowded with orders, and within the last three months the orders for export have gone very far ahead of all previous years. In fact, the record which American machinery-makers are establishing in foreign countries is bringing, and will continue to bring an increasing volume of business. It is comforting to turn over the pages of our national day-book and read the day-by-day increasing totals of business, and note the evidences of expanding activity; but it is well, at the same time, to keep in mind that the foundations of this prosperity can be shaken or weakened by a defective financial policy, if not by a defective fiscal system. The more or less intelligent consideration which these questions are receiving is encouraging, and points to the probable favorable solution of them. Yet the country is in need of more wisdom in high places than has yet been made manifest. No doubt, if a crisis ever occurs, the times will produce the men who will guide the country safely out of it, as has ever been the case in our past history. A wiser financial system is needed; but it will come only when circumstances crowd it upon us, after the manner that all great reforms and great steps in progress have been made. The facts concerning recent market and trade developments may be very briefly enumerated. The export trade is heavy. Gold is filtering to this side; the great West is absorbing increasing quantities of Eastern products, in anticipation of winter wants. Large Eastern supplies which have been accumulating since late summer are being depleted rapidly. Jobbers and travelling agents are full of business. Manufacturers, big and little, are busy. Shop-capacity everywhere is well employed. Railroad building is being crowded ahead almost as rapidly as in our phenomenal years. A great deal of new work is hanging fire. Much capital is slipping southward into new and inviting fields. Financiers are saying "Beware!" But this apparently extraordinary activity is becoming our normal business condition. Material manufacturers are preparing for a large increase in production. Both wire and cut-nail makers are increasing their output, in spite of discouraging trade conditions. Tool and implement makers, and the producers of machine-shop supplies, have had an exceptionally good season since September 1. A great many new industries are taking root, as is shown by the increasing number of companies being formed throughout the country. This is a year favorable to men of small capital. The greater corporations which, a few years ago, overpowered the lesser, are not now as able to cover all the corners of the widening field as then. The secret of this fact is, that the population of the country is spreading into the new region west of the Mississippi, and as new communities spring up new sources of supply must spring up near them, and large investments of capital are impossible under such circumstances. The workingmen of the country are looking more anxiously towards what can be accomplished by legislative or political action than by strikes. A few anthracite miners are vainly trying to secure better terms from their employers. The coke-makers have been unable to come to terms. The iron-workers are quiet. The building trades are crowded with work. The tool-makers and all machine-shop labor were never more busily employed. Employers generally are standing together with greater mutual confidence, even though where they are not united in actual organization. The fear which overtook so many of them a year or two ago at the threatening attitude of labor has subsided.